Hitachi Air Conditioning Europe SAS
UK Branch.
Whitebrook Park, Lower Cookham Road, Maidenhead, Berkshire SL6 8YA

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V1 – 2/15

Hitachi Yutaki Heat pump Installation reference manual

Model Numbers
RHUE-3AVHN1
RHUE-(3-6)A(V)HN-HM

General

This manual is provided by Hitachi Air Conditioning Europe (HACE) for reference use by qualified installers of the Yutaki range of heat pumps. Qualified installers will have attended the Hitachi recognised training course before installing any Hitachi product. Non attendance of such a course in a recognised Hitachi training centre may void the warranty on any products supplied.

This manual does not replace the service manual which is referred to within these pages. This manual provides guidance only as to the key elements of the design and installation of heat pumps and heating system design (docking options) referred to on the front cover of this manual.

This manual refers to the Yutaki M series heat pump service manual SMGB0090 rev.0 – 01/2014

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All regulations for water usage, energy efficiency, electrical safety and others as applicable to the installation in force at the time of the installation must be adhered to and all such regulations shall take precedence over any advice and inference given herein.

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Quick Start

1. Select which type of system you wish to install. See flowchart overleaf.
2. Determine where the various system components should be installed.
3. Mount the system components.
4. Connect the sensors, RF receiver, Heat pump and other system components to the systems controller according to your selected system configuration.
5. Power up the system controller and perform a factory reset by pressing the RESET button, select language and hydraulic configuration.
6. Set the date, time and essential system parameters according to the selected system configuration.
7. Set the DHW program if required.
8. Ensure room unit is communicating with the system controller. If not, perform binding procedure.
9. Set time/temperature profile in accordance with customer's wishes.
10. Review all parameter settings according the chosen system configuration.
11. Test the system
12. Complete commissioning documentation and show end user how to operate the room unit.
13. Leave all literature with the customer.
14. Return Commissioning certificate to Hitachi in order to activate warranty.

Important Considerations

Pre-Installation

Identify suitable space for Heat Pump, Domestic Hot Water (DHW) cylinder and heating buffer tank.
Consider location of key plumbing components bearing in mind requirement for maintenance access.
Availability of suitable water supply.
Availability of suitable electricity supply, *N.B. many supply distribution authorities require notice prior to connection heat pumps.*

Installation

As Quick start above

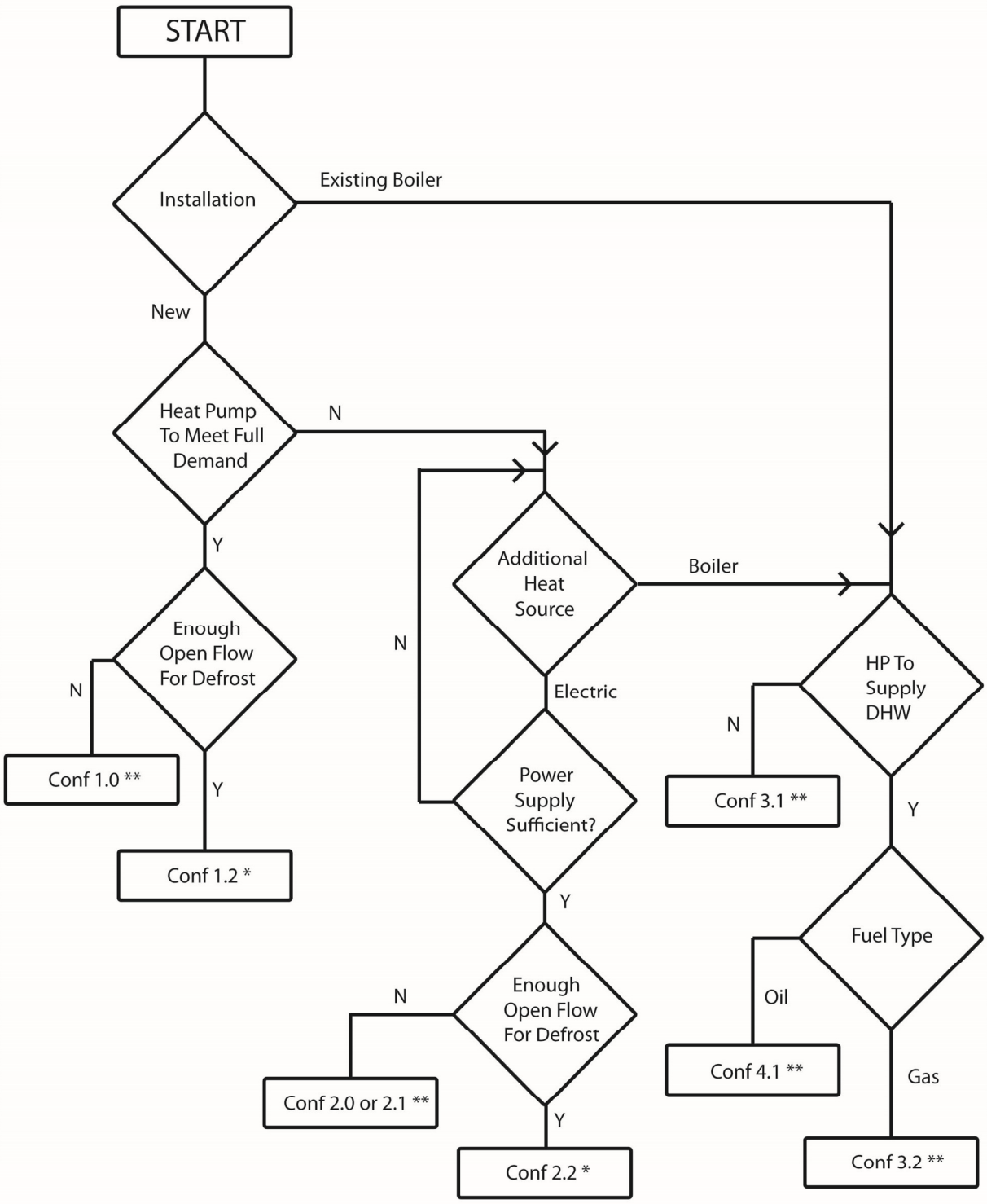
Post-Installation

Thorough explanation of system and heating controls to customer at handover.
Registration for Renewable Heat Incentive (RHI) or other benefits that may be eligible if applicable.
Registration of system with the Micro-generation Certification Scheme (MCS).

Servicing

Recommend annual servicing to check for debris in strainer and ensure heat pump airways are clear.
Replace batteries in room unit.
Always check system parameters have not been altered and check alarm history for anomalies.

Quick start system configuration selection



* HC1 pump power must be derived from ASC: X1

** All heating circuits pumps may be powered locally providing buffer capacity is sufficient for defrost

Introduction

Where correctly installed and maintained the Yutaki heat pump will provide adequate heating and hot water all year round. It is important that the correct system configuration (docking option) has been chosen by the system designer to ensure that comfort is maintained for the customer under typical outdoor temperatures and hot water usage conditions relevant to the geographical area and household demands.

The performance of Micro-generation heat pump systems is impossible to predict with certainty due to the variability of the climate and its subsequent effect on both heat supply and demand. HACE endeavors to provide the best available information at all times but is given as guidance only and should not be considered as a guarantee.

The system designs outlined in this manual include provision for heating only (Configuration H), heating and hot water generation using the Heat Pump alone (Configuration 1.0 and 1.2), the Heat Pump with electric backup (Configuration 2.0, 2.1 and 2.2) and the Heat Pump with boiler backup (configuration 3.2 and 4.1). There is also an option to include Domestic Hot water only from the boiler and heating from heat pump with boiler support (configuration 3.1).

The defrost cycle uses heat from water in the heating system. The designs outlined assume that there will be sufficient system water volume and flow available at all times for the Heat Pump to defrost. The defrost cycle will normally take water from the buffer tank but where this is not sufficient or no buffer tank is fitted, there must be sufficient water volume with no restrictions of the heating water flow by closed zone valves, underfloor heating actuators or thermostatic radiator valves.

If in doubt, please contact HACE Technical Support for further advice.

The table shown below provides theoretical information about the available volume of system water for defrosting and the reduction of temperature of the system water during the defrost operation.

	Model				
Water temperature drop	**RHUE-3AVHN1**	**RHUE-3A(V)HN1-HM**	**RHUE-4AVHN1-HM**	**RHUE-5A(V)HN1-HM**	**RHUE-6A(V)HN1-HM**
5°C	232	212	276	342	410
10°C	118	106	138	171	205
15°C	77	71	92	114	137
20°C	58	53	69	86	103
25°C	46	42	55	68	82

Note: *The values shown above are based on theoretical installation conditions. Values can vary for different hydraulic circuit configurations. Installers should recalculate these values for the real conditions of their installation.*

Domestic Hot Water (DHW) is normally maintained at around 50°C in the hot water cylinder thus preventing the growth of harmful bacteria even in normal use. However, protection against the growth of legionella bacteria is provided by periodically raising the water temperature in the DHW cylinder.

The heat pump provides a variable power output depending on the heating and hot water load. The power output variation is achieved by a variation of speed of the compressor and fan systems within the heat pump. The control of the heat pump power is maintained at optimum efficiency and effectiveness by the Advanced System Controller (ASC). Heating and hot water load is determined automatically by the use of sensors which monitor the outside air temperature, indoor temperature and water system temperatures.

Full heat loss calculations in accordance with BS EN 12831 must be carried out by the system designer in order to accurately determine the size of the required Heat Pump.

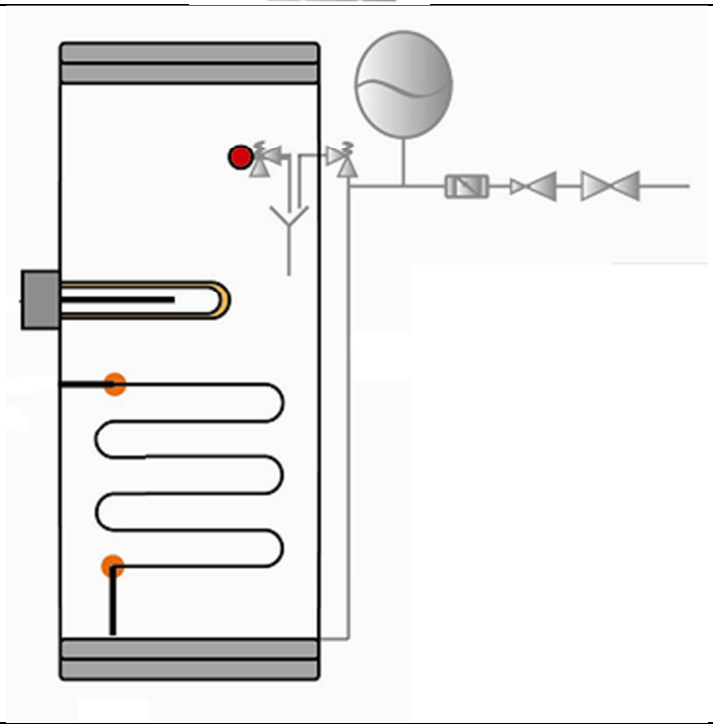
At the time of writing, planning permission is not generally required for air source heat pumps in the United Kingdom. However, planning considerations and calculations must be carried out in accordance with MCS 020 which can be found on the following web site:
http://www.microgenerationcertification.org/mcs-standards/installer-standards

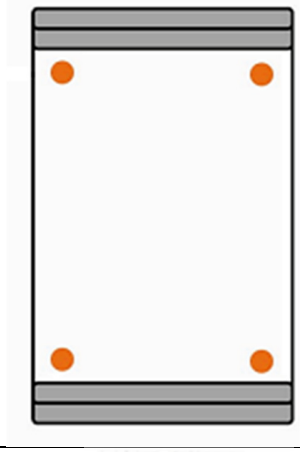
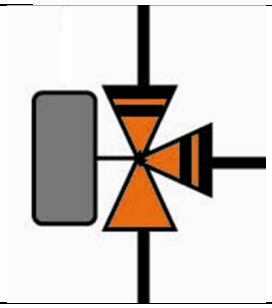
Note: The Yutaki heat pump has been approved under the Micro-generation Certification Scheme (MCS). The installer of the equipment must also be accredited under MCS for the appropriate technology and the installation must meet the requirements of MCS in order to be eligible for any benefit under the Renewable Heat Incentive (RHI) scheme.

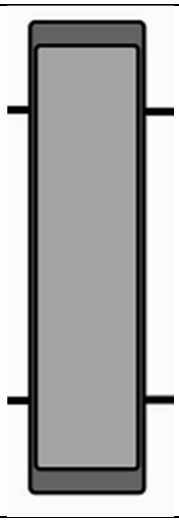
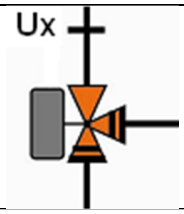
Electricity supply authorities may need to be informed prior to installation of current using equipment. Always check with your local distribution company before planning the installation.

List of Accessories

The following accessories are available from Hitachi in order to assist the installer in meeting design requirements. Installers may choose to source their own parts at their discretion. In order to ensure equipment warranties are preserved it is important that installers satisfy themselves that such parts will allow the system perform within specified parameters.

Accessory	Drawing symbol	Notes
Wilo ERP Approved buffer loading pump		Additional accessories are required in order to fit the this pump inside the Heat Pump casing as hydraulic fittings within the heat pump are different from standard UK plumbing sizes.
Pump adaptor kit	n/a	
Anti-vibration feet		Must be securely anchored to the heat pump and to the ground.
Heat Pump compatible DHW Cylinders with G3 kit		Available as 180L, 210L, 250L (solar option), 300L (solar option)

4 Port Buffer tank		Available as 50L, 95L, 150L, 210L
Flexible hose kit		Contains 2 x hoses with 1” BSP M thread and fibre washers.
Full bore isolation valve		
Full bore isolation valve with strainer		
3 Way Valve		1 x 3 port zone valve

Hydraulic separator		Only to be used in systems with sufficient open flow water volume to meet the requirements of the Heat Pump.
Electric Water-Heater		Must be fitted in accordance with Hitachi recommendations for pump and bypass as required.
2nd temperature kit		Contains Mixer valve and sensor to enable control of a low temperature heating circuit
Advanced System Controller Pack		Refer to Advanced System Control Reference Manual

Key installation considerations

Installations within 4km of the Sea or Ocean will require an anti-corrosion protection treatment. In such circumstances the Blygold option must be chosen when the Heat Pump is ordered.

The heat pump must be mounted externally away from obstructions which might prevent smooth air flow through the unit. Mountings shall be such as to prevent noise and vibrations from causing nuisance to building occupants or neighbouring property's. The heat pump should be sited away from sleeping areas and shall be sited away from the influence of strong winds.

Provision shall be made for maintenance access to the unit, particularly from behind and to the right looking at the machine from the front.

Provision shall be made for the safe removal of waste evaporative water from the heat pump which is produced during the defrost cycle. This is particularly important during winter months when ground freezing may occur. The run off from the defrost process must be directed away from foot paths, patios and roadways.

Pipework external to the building shall be insulated against extreme temperatures in order to prevent loss of heat from the system.

Freeze protection of working units is not required due to the automatic frost protection function of the heat pump. Caution must be exercised under cold conditions as the heat pump may start unexpectedly. In exceptional circumstances or when there is a possibility of power loss during cold conditions, it is recommended that an anti-freeze solution be added to the heating system in order to provide freeze protection.

All electrical wiring shall be suitably protected against accidental damage and ingress of moisture to any part of the heat pump.

The heat pump may be connected to the heating system via a heating buffer tank which provides a ready supply of heated water for the heating system to draw on at any time. The water in the buffer tank will be heated to a temperature that is set by the operating parameters of the system and is dependent on the outside temperature, the desired comfort level within the building and the selected heat curve within the controller.

It is important that the end user understands that the temperature of the buffer set by the above parameters may limit the flow temperatures within the heating system irrespective of local control settings at radiator or under-floor heating zone control level.

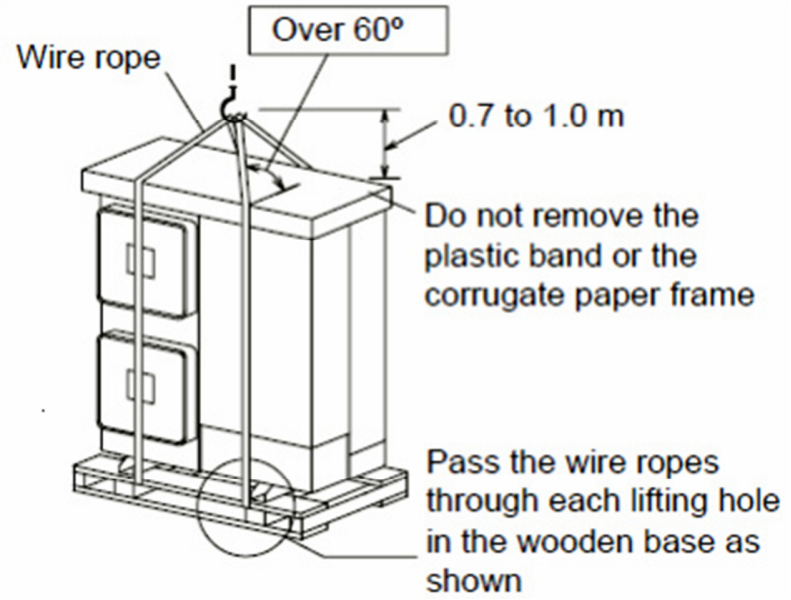
Systems that do not include a buffer tank are reliant on the rapid delivery of heated water from the heat pump and any backup heat sources in order to meet heating demand.

Domestic hot water heating is prioritised over space heating by the controller during the 2 periods that are set in the system controller. This priority may be periodically disabled by the use of the Tariff/Timer input on the system controller in order to prevent excessive reductions in heating capacity if the hot water temperatures cannot be achieved by the heat pump during the normal hot water generation cycle.

Diversion of water to heating or hot water generation is facilitated by the system controller and carried out by the use of pumps and/or valves. Where possible it is recommended that pumps only are used in order to maintain system reliability and in order to maximise operating efficiency and minimise the likelihood of breakdown between system servicing.

Transportation
The heat pump must be transported in its original packaging in an upright position only.

If lifted by hoist or crane observe the following precautions.


Wire rope
Over 60º
0.7 to 1.0 m
Do not remove the plastic band or the corrugate paper frame
Pass the wire ropes through each lifting hole in the wooden base as shown

- Use suitable wire lifting ropes only
- Protect the unit against abrasion from the lifting ropes
- Lift smoothly
- When handling manually, ensure adequate personal are involved to prevent damage or injury.
- Do not remove wooden base from unit until final installation
- Always lift using suitable slings
- The Centre of gravity of single fan units is 440mm from base of heat pump
- The Centre of gravity of twin fan units is around 550mm from base of heat pump
- See the service manual Page 12 for greater detail of weight distribution

Installation space
Sufficient space shall be provided around the heat pump to allow fresh clean air to be drawn from the rear of the unit, through the fan(s) and expelled safely from the front. Cold air expressed from the front of the unit must not be allowed to re-circulate to the rear of the unit. Access must be made available from the sides and above the unit for maintenance purposes.

A minimum space of 200mm must be left between rear of the heat pump and the nearest wall. Ideally this distance will be greater than 200mm in order to allow sufficient access for maintenance of the unit.

Any roof or structure connected to the rear wall shall be at least 1000mm above the heat pump.

A clear space of at least 600mm shall be made in front of the heat pump. Plants or foliage in front of the heat pump may provide a good source of visible protection and absorb some of the high frequencies generated by the inverter but at this distance, should not be allowed to grow above half the height of the unit. The air expressed from the front of the heat pump shall often be at sub zero temperatures which may damage such flora .

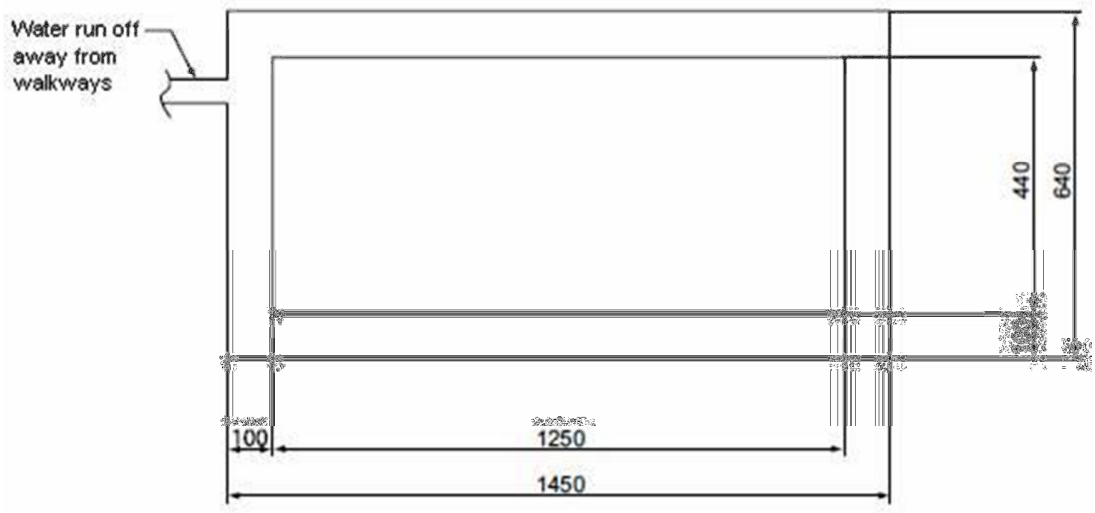
Ideally 500mm should be made available either side of the heat pump to facilitate efficient air flow and allow maintenance access. In exceptional conditions, this space may be reduced to the absolute minimums expressed in the service manual, although performance may be affected and maintenance access may be compromised.

The heat pump should be sited away from sources of falling leaves, build up of snow and strong winds.

Details of space limitations for more complex spaces are shown on page 13 of the Service manual.

Mounting

Ideally the heat pump shall be mounted on a concrete base of dimensions greater than 440mm x 1250mm. The base shall be separated from any dwelling and shall provide drainage for any condensate run off. A typical base is shown below.



Drainage must be made available from the slab for rainwater runoff and heat pump condensate. Condensate is fresh water without contaminants but may be very cold and subject to freezing during cold weather. Such run off must be directed away from walk ways and shall ideally be to gravel surrounding the concrete base to aid natural drainage.

The heat pump should be fitted with anti-vibration mounts. After levelling the heat pump on the base, the mountings must be secured to the heat pump and the ground to prevent accidental tipping of the machine. Additional protection must be provided between the rear of the machine and the nearest wall to further safeguard against accidental tipping due to unforeseen loads being applied to the top or rear of the machine. Where rigid fixings are used, anti vibration elements must be provided between the bracket and the wall.

Further mounting options and detailed dimensions of the heat pump feet are given on page 14 of the service manual.

Optional parts are available to assist operation in positions exposed to wind and snow. Details of these parts are given in the service manual on pages 16 to 20.

Hydraulic installation

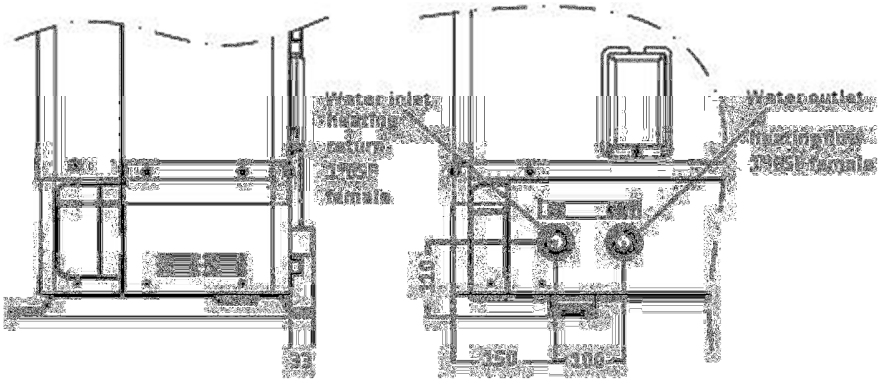
Where the heat pump is not delivered with an internal buffer loading pump fitted, the pump and adaptor accessories must be obtained. Please check options when ordering.

The buffer loading pump flow direction varies on different models. It is essential that water flow is in the correct direction. Extreme care must be taken when fitting the pump accessory to ensure correct pump operation.

Where the buffer loading pump is not fitted inside the heat pump, it may be fitted elsewhere but as close to the heat pump as is reasonably practicable.

The heat pump must be fitted with two flexible hoses which must be connected directly to the heat pump in order to prevent vibrations from the unit affecting adjacent buildings and internal pipe-work.

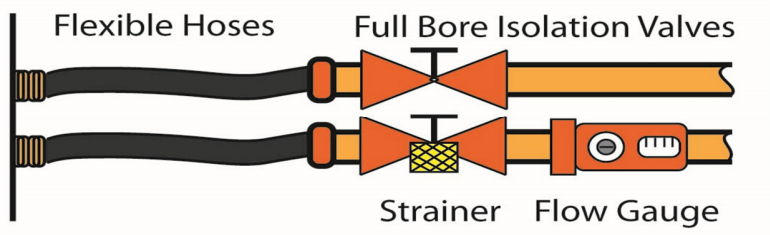
Heated water flows from the heat pump water outlet and returns from the system to the heat pump water inlet. These connections are at the rear of the machine as shown below.



N.B.
Water outlet is heating flow
Water inlet is heating return.

NOTE: Failure to observe correct connection of flow and return pipe-work will prevent correct system operation and may result in damage to the heat pump.

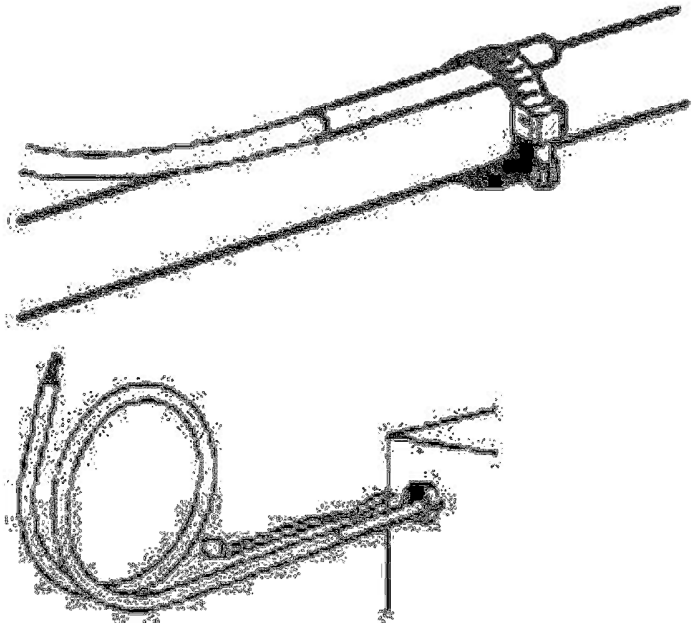
The strainer must be fitted immediately after the flexible hose from the water inlet to prevent ingress of particles to the heat pump heat exchanger. The strainer must be securely fixed on both sides with brackets on solid pipe-work. Positioning of the strainer must be such that easy access for regular inspection and cleaning of the filter element can take place. Full bore isolation valves must be fitted in both the flow and return pipe-work in order to facilitate strainer removal with minimal loss of system water. A combined isolation valve and strainer is available from HACE as an accessory.



All external pipe-work, valves and fittings must be properly fixed, soundly insulated and weather proof. Identification of flow and return pipe-work and accessibility of strainer and isolation valves is essential for ease of maintenance.

All pipe-work from the heat pump to the system components (Hydraulic separator, DHW cylinder, Buffer tank etc.) must be 28mm copper in order to minimise pressure drop and maintain system efficiency under worst case operating conditions. All remaining pipe-work shall be selected and sized according to system design considerations as set out in this document, local requirements and regulations in force at the time of installation.

Sensors must make a mechanically sound and thermally efficient connection to pipe-work and sensor pockets. Use of thermal transfer (e.g. heat-sink) compound, mechanical fixings and aluminium tape are recommended, surrounded by good quality thermal insulation.



Advanced System Controller (ASC) pack

The Heat Pump is supplied with an Advanced System Controller pack. This comprises the following components:

- Advanced system Controller (ASC)
- Terminal packs (1 white (power), 1 black (control and communications))
- Wire routing bar
- Safety covers x 2
- Temperature sensors x 2
- RF Receiver
- Remote RF room unit with batteries
- Manuals

Brief technical reference information about the hardware connections and operation of the ASC are given in the reference manual accompanying this document.

Detailed Installation and usage instructions for the ASC and room unit are provided in the manuals enclosed in the ASC pack.

A simple user guide for the operation of the Room Unit is provided at the end of this manual.

Electrical installation

General
The installation of electrical systems comprise:

a) Power distribution
b) Power control
c) Monitoring and communication

All of the above elements must be considered at the planning stage in order for the installation to be efficient and effective.

The Power distribution elements are there to make sure that power is available from the mains power source or consumer unit and is available in a safe and protected manner to all aspects of the system.

All installations must comply with BS7671. The requirements of BS7671 always take priority over any information implied or given in this document.

The Advanced System Controller distributes both power and control functionality to the system pumps, valves etc. and provides mains power control to the cylinder immersion relay. Some control functions between the heat pump and controller operate at mains voltage and hence it also falls within the power control category.

The monitoring and communication wires are mainly extra low voltage and as such must be run separately from the power and power control wiring.

Electrical power is generally required for the following system elements:

1) Heat pump
2) Advanced System Controller (ASC)
3) Cylinder immersion heater
4) Cylinder immersion relay
5) Additional heat sources and associated relays as required e.g. boiler, electric heater etc.

The wireless room unit is powered by batteries and does not require a mains power supply.

Each element should have a separate power system with suitable fuse protection. All system elements shall be powered from the same phase and where split load consumer units are used and full isolation of Neutrals cannot be guaranteed. All systems shall be powered from the same side of the consumer unit. Where 3 phase units are installed, L1 shall be used for all control functions.

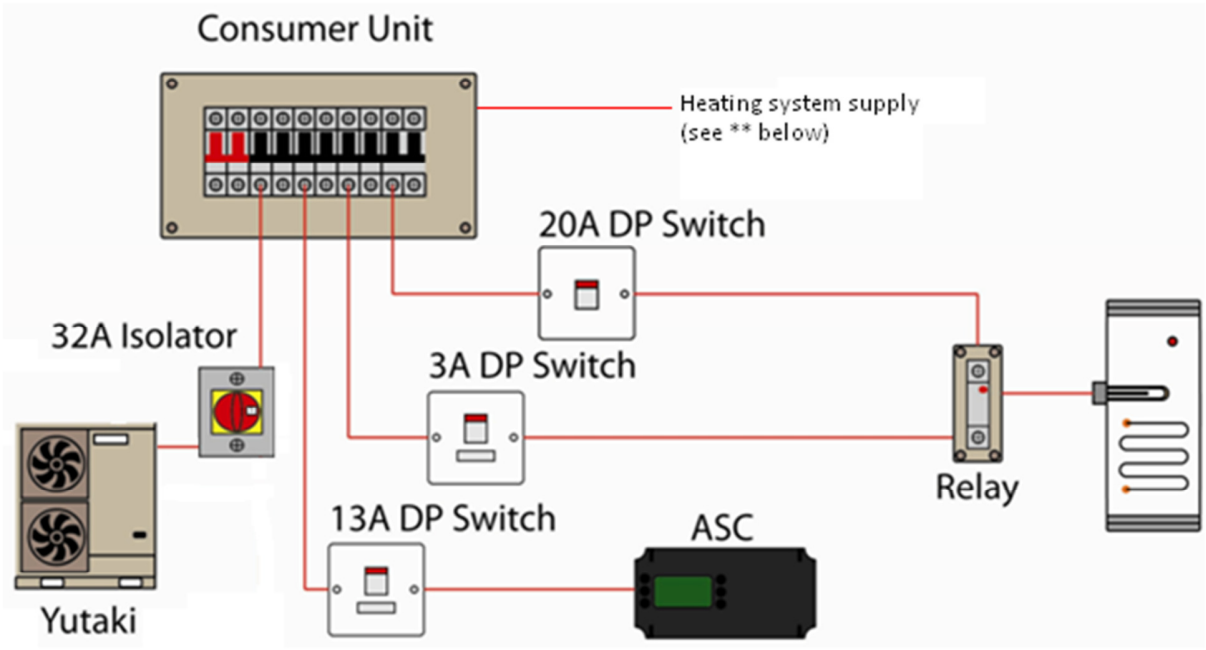
The following table shows the power rating for each heat pump model.

Model	Power supply	Max. Voltage ()	Min voltage (V)	Max. Current (A)
RHUE-3AVHN1	1~ 230V 50Hz	253	207	21.8 (*18.5)
RHUE-3AVHN-HM	1~ 230V 50Hz	253	207	21 (*18)
RHUE-4AVHN-HM	1~ 230V 50Hz	253	207	21 (*18)
RHUE-5AVHN-HM	1~ 230V 50Hz	253	207	29 (*26)
RHUE-6AVHN-HM	1~ 230V 50Hz	253	207	32 (*29)
RHUE-5AHN-HM	3N~ 400V 50Hz	440	360	14 (*11)
RHUE-6AHN-HM	3N~ 400V 50Hz	440	360	18 (*15)
*Current excluding buffer loading pump				

The cylinder immersion heater is rated at 3kW. A 13A fused outlet should be provided for this item.

All control circuits are relatively low power with the greatest of these being the circulation pumps. These pumps may be powered from the system controller providing each accessory is rated at less than 3A and that the total load on the system controller does not exceed 10 Amps.

Example Power Distribution (minimum system configuration)
N.B. this does not show control wiring between units or more complex system designs which may include additional heat sources and hence require additional isolation and protection devices



All low power ancillaries such as pumps, valves etc. derive power either from the heat pump in the case of the buffer loading pump and the system controller in the case of all other equipment.

All ancillaries with a power consumption of greater than 3A or that would otherwise require a ***total*** power derivation from the system controller of greater than 10A MUST be powered by an isolating relay or contactor.

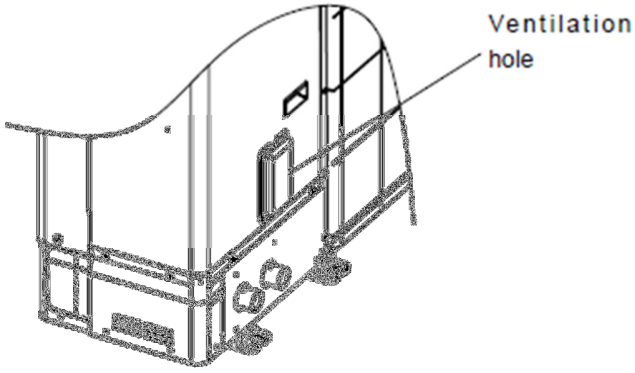
**** Heating System Electrical Connections**
Electrical wiring for heat distribution systems is outside the scope of this manual.

It is generally assumed that all heating control and power systems will be entirely separate from the Heat Pump electrical system and as such additional circuits will be required. Local control of individual elements of the heating system should reduce energy consumption by preventing the running of heating circulation pumps when zones are up to temperature.

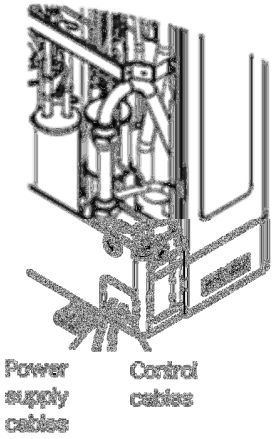
Where it is essential for the System Controller to ensure circulation, for defrost functions etc. where there is no suitable buffer tank, the associated control function for at least one open flow heating circulation pump must be derived from the Advanced System Controller (normally X1). This may be a direct connection, via a relay or via a contact on the associated 2 port valve as applicable.

Heat Pump Electrical Connections

Do not pass cables through the ventilation hole at the rear of the Heat Pump.



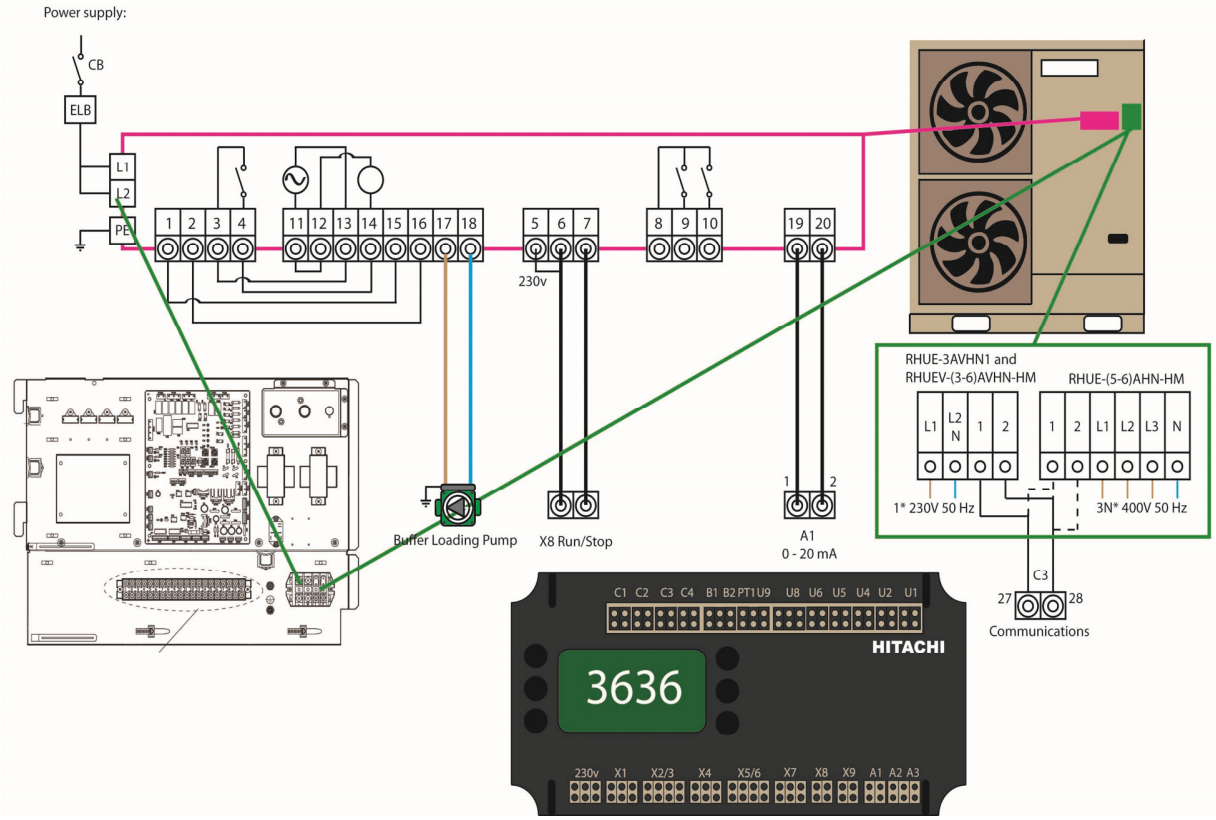
Do not pass cables through removable covers as this will prevent access for maintenance.



An access plate is provided at the front of the Heat Pump to allow power and control cables to enter the machine.

If the case of the Heat Pump is drilled to allow for conduit entry, ensure that adequate protection is made to prevent damage to internal parts. Ensure that suitable cable entries are used to prevent corrosion of the machine covers and prevention of water ingress to the Heat Pump.

Connections from the Heat Pump to the buffer loading pump and Advanced System Controller are shown below.



Heat pump Connections as follows:

Power
TB1 Live, Neutral and CPC (Earth) connections to locally switched supply

Communications (See Inset Photo)
TB1 Terminal 1 to System controller C3 port Terminal 27 (extra low voltage)
TB1 Terminal 2 to system controller C3 port Terminal 28 (extra low voltage)
Caution. These terminals are adjacent to the main incoming power supply

Buffer loading (water circulation) pump
TB2 Terminal 17 to pump Live
TB2 Terminal 18 to pump Neutral
Earth Terminal to pump Earth

PTO

N.B. Accessory ATW-HPA-01 is required if not already fitted in order to enable communication link between Heat Pump and Controller

Heat pump Connections cont'd

Heat Pump On/Off remote switching
TB2 Terminal 6 to System controller X8 terminal 1 (230V)
TB2 Terminal 6 to System controller X8 terminal 2 (230V)

Heat Pump remote temperature control
TB2 Terminal 19 to System controller A1 terminal 1 (extra low voltage)
TB2 Terminal 20 to System controller A1 terminal 2 (extra low voltage)

Note: Mains voltage and extra low voltage cables must be run separately

Heating System hydraulics

The Heat Pump may, with careful design, be connected to a heating system directly without the use of a buffer tank or hydraulic separator. However, such a connection is outside the scope of this manual. Before considering such an installation, technical advice must be sought from HACE.

The hydraulic separator, also known as a low loss header, is a useful device which enables balancing of different heating devices and heating circuits which may have their own pumps whilst minimising the effect on the performance of the heat pump primary loading circuit. It is physically very small in comparison to a buffer tank.

The down side of a hydraulic separator is that it has very little water volume and so the volumes of water required in order to satisfactorily achieve good heat pump performance without cycling and adequate defrost performance will require a relatively large volume of open flow heating system water (uncontrolled by valves etc.). Further, the primary heating circuit pump needs to be controlled by the Advanced System Controller which may lead to the heating water circulation being operational when the property heat load is otherwise satisfied. The 'no load' function of the controller mitigates this to a certain degree but this is not always satisfactory.

A suitably sized buffer tank resolves these problems but will of course require allocation of appropriate installation space.

Ideally, the system will be considered as 2 separate entities:

1) The Heat Pump and associated controls which will heat the buffer tank with some unrestricted heating area in order to allow the Advanced System Controller room unit to feed back room temperature and hence properly regulate buffer water temperature.
2) The heating system which will only run circulation pumps for heating zones requiring heat based on local thermostat settings.

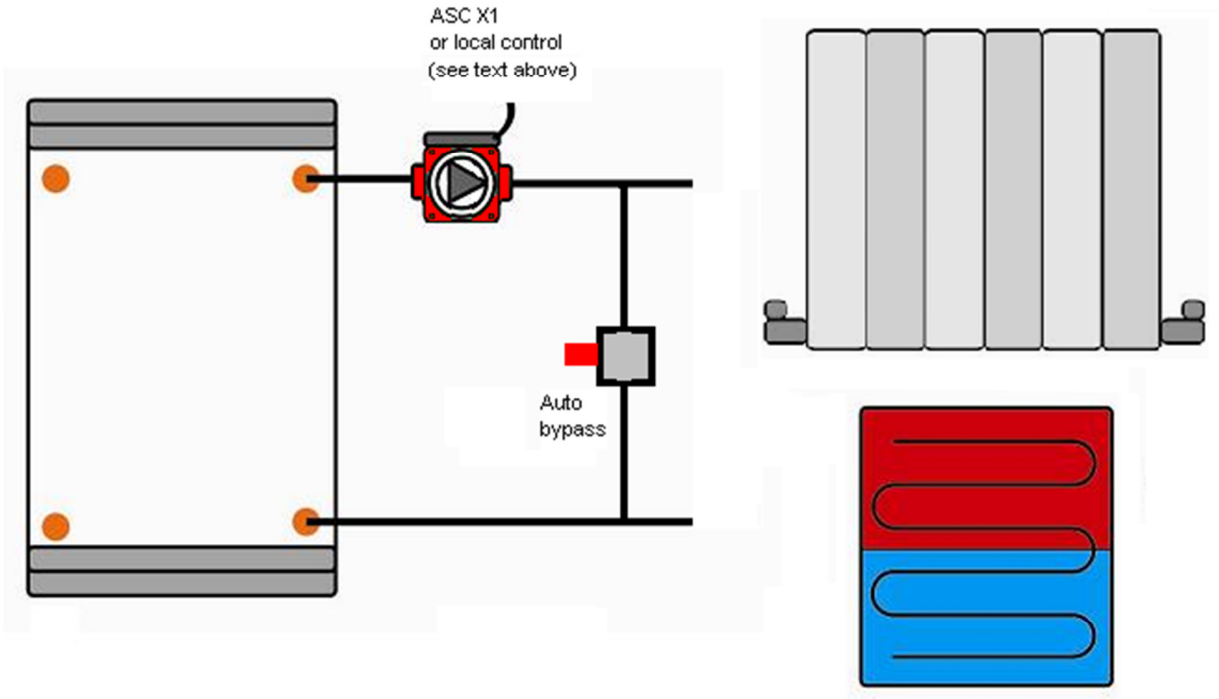
Control of flow temperatures in low temperature heating circuits can still be affected by the ASC and if required, up to 2 heating circulation pumps can also be controlled directly by the ASC.

Where buffer loading is achieved through a 2 port valve and HC1 is required to provide heating circulation, the circulation pump should be powered from a separate supply via the valve contacts in order to prevent over-loading of the ASC output.

Where possible, except when a Hydraulic separator is used, HC1 circulation should be derived from local heating controls. It is important to ensure however, that buffer loading is timed to take place when there is likely to be a heating demand from any part of the system.

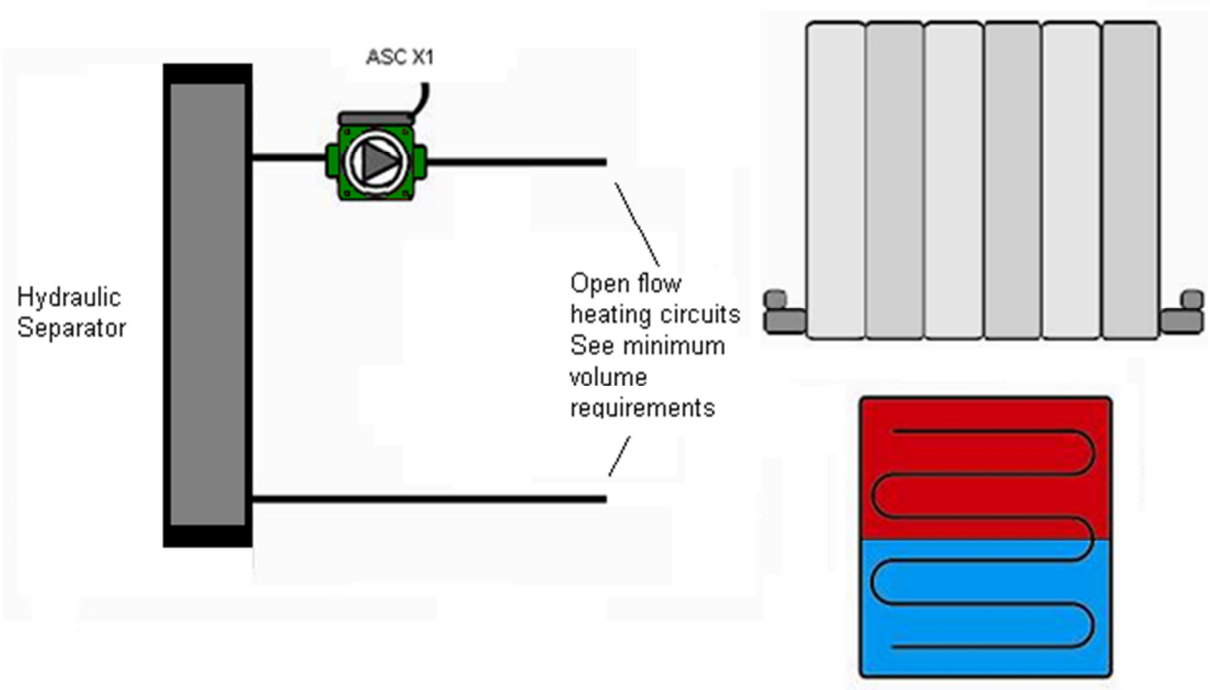
The diagrams, connections and settings set out on the following pages provide examples of heating system layouts and relevant connections to the Advanced System Controller. This information is provided for guidance only. Detailed system design must always be carried out in order to ensure correct system operation.

Heating circuit examples - 1



Single circuit unmixed (essential settings)		
Parameter	**Description**	**Menu**
P101	Heating circuit 1 type 0 (direct)	03>01
P102	HC1 OTC heating curve (set as required for system and building type)	04>01>00
P103	HC1 Heating system emitter type 0= UFH, 1=Radiator, 2=Convector	04>01>01
System Configuration (other settings)		
P104	HC1 Room compensation settings	04>01>02
P105, P106	HC1 minimum and maximum supply set-points	04>01>03-04
Inputs to system controller		
U1	System supply temperature sensor (May be on supply to Buffer or in buffer, see configuration options for detail)	Extra Low voltage
Outputs from system controller		
X1	Heating circuit 1 circulation pump if not derived from local heating controls	230 Volts

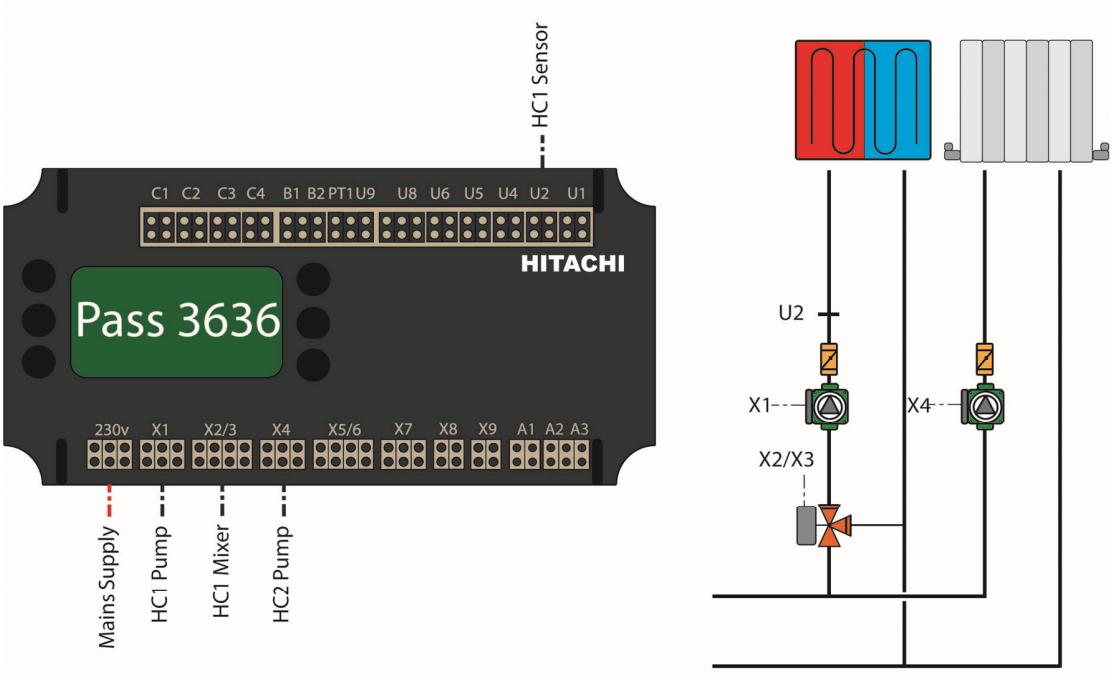
Heating circuit example 2



Single circuit unmixed (essential settings)		
Parameter	**Description**	**Menu**
P101	Heating circuit 1 type 0 (direct)	03>01
P102	HC1 OTC heating curve (set as required for system and building type)	04>01>00
P103	HC1 Heating system emitter type 0= UFH, 1=Radiator, 2=Convector	04>01>01
System Configuration (other settings)		
P104	HC1 Room compensation settings	04>01>02
P105, P106	HC1 minimum and maximum supply set-points	04>01>03-04
P108	Mixing valve running time (see manufacturers data)	04>01>06
Inputs to system controller		
U1	System supply temperature sensor (See configuration drawing for position)	Extra Low voltage
Outputs from system controller		
X1	Heating circuit 1 circulation pump	230 Volts

Heating circuit examples – 3

*HC1 pump ***must*** be powered from X1 if no buffer tank is fitted

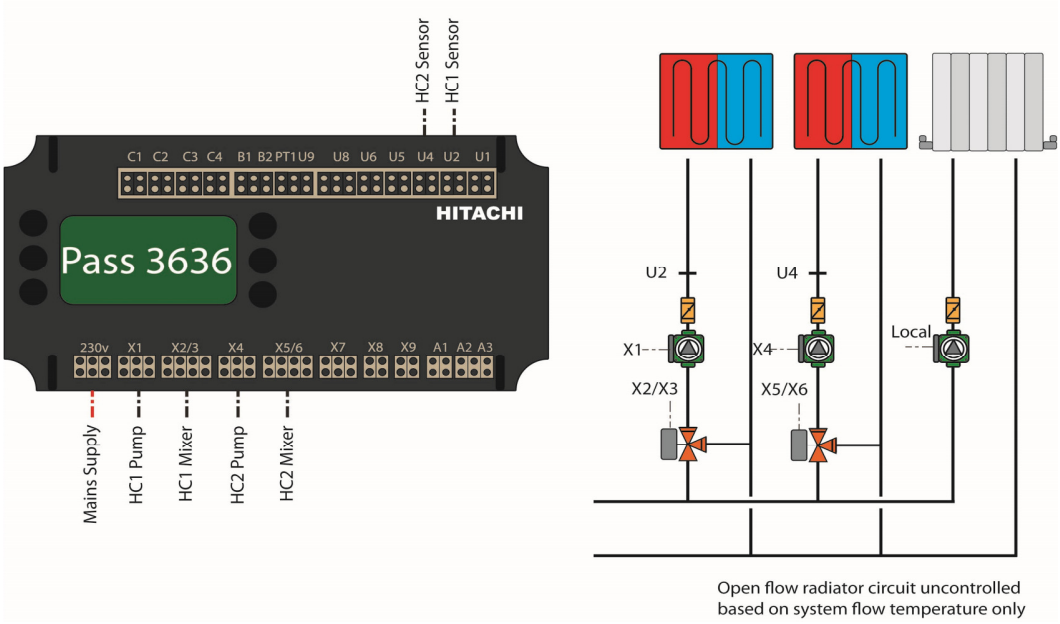


2 circuit – 1 mixed (essential settings)		
Parameter	**Description**	**Menu**
P101	HC1 type 1 (mixing)	03>01
P201	HC2 type 1 (direct)	03>02
P102	HC1 OTC heating curve (set as required for system and building type)	04>01>00
P103	HC1 emitter type 0= UFH, 1=Radiator, 2=Convector	04>01>01
P202	HC2 OTC heating curve (set as required for system and building type)	04>02>00
P203	HC2 emitter type 0= UFH, 1=Radiator, 2=Convector	04>02>01
System Configuration (other settings)		
P104	HC1 Room compensation settings	04>01>02
P105, P106	HC1 minimum and maximum supply set-points	04>01>03-04
P108	Mixing valve running time (see manufacturers data)	04>01>06
P204	HC2 Room compensation settings	04>02>02
P205, P206	HC2 minimum and maximum supply set-points	04>02>03-04
P208	Mixing valve running time (see manufacturers data)	04>02>06
Inputs to system controller		
U1	System flow sensor (See Configuration drawing)	Extra Low voltage
U2	Heating Circuit 1 flow sensor	Extra Low voltage
Outputs from system controller		
X1	Heating circuit 1 circulation pump (alternatively powered from local heating system, see text)	230 Volts
X2:X3	Heating circuit 1 mixing valve	230 Volts
X4	Heating circuit 2 circulation pump (alternatively powered from local heating system, see text)	230 Volts

Heating circuit examples - 4

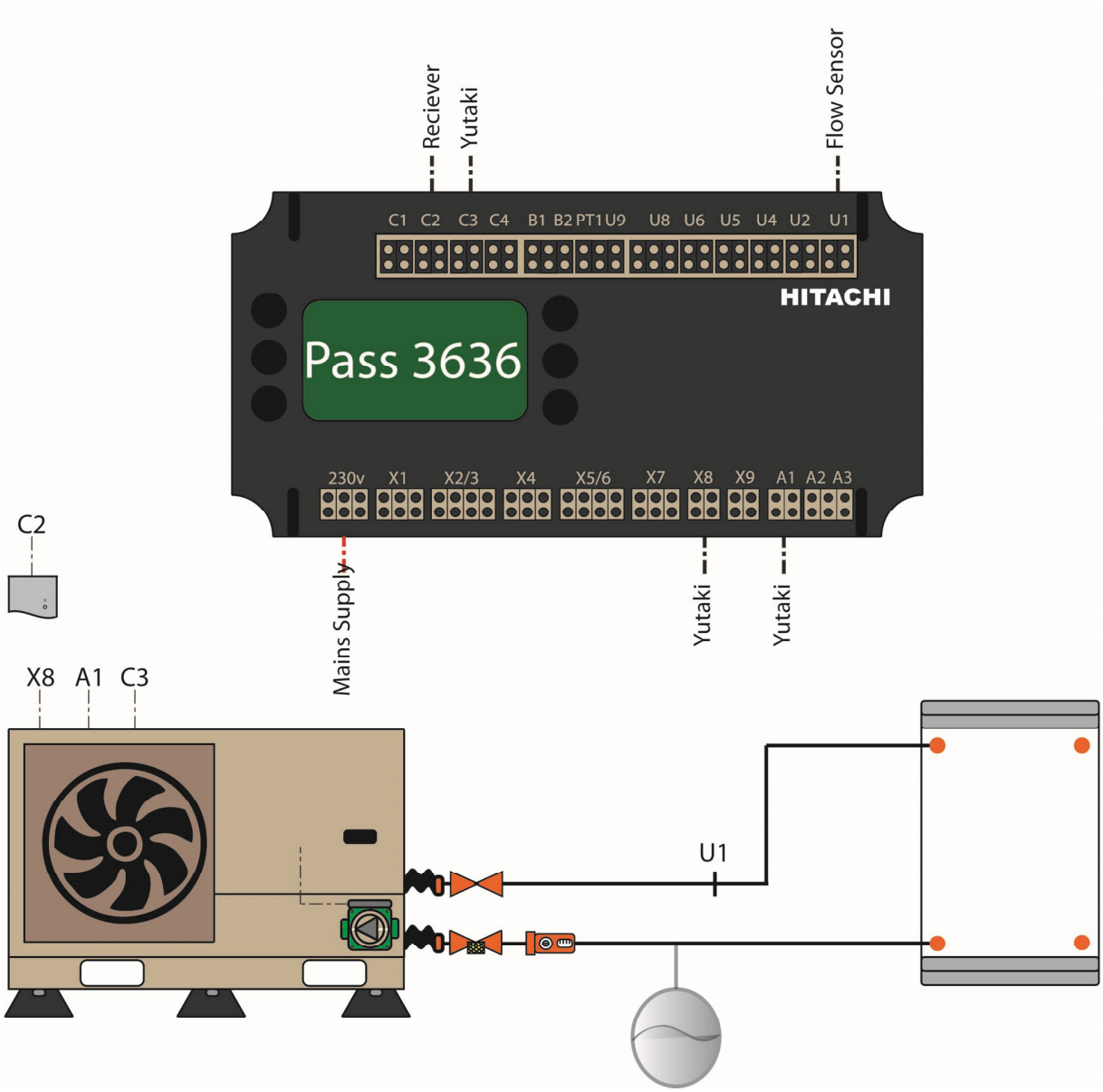
N.B. This system is not compatible with boiler operation as X5:X6 are used for boiler control

*HC1 pump must be powered from X1 if no buffer tank is fitted



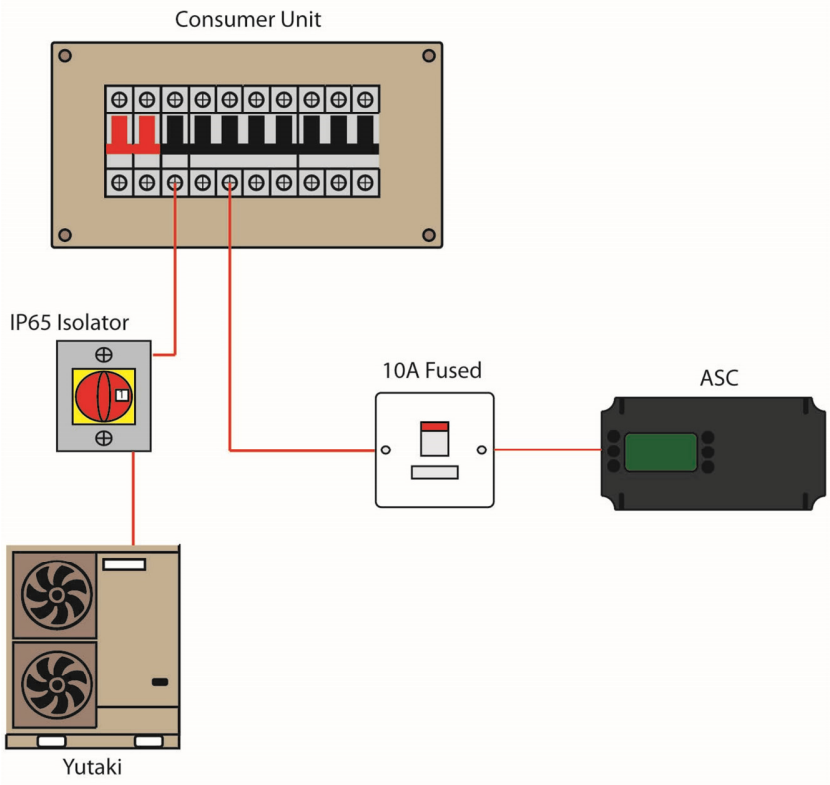
2 circuit – both mixed (essential settings)		
Parameter	**Description**	**Menu**
P101	Heating circuit 1 type 1 (mixing)	03>01
P201	Heating circuit 2 type 2 (mixing)	03>02
P102	HC1 OTC heating curve (set as required for system and building type)	04>01>00
P103	HC1 Heating system emitter type 0= UFH, 1=Radiator, 2=Convector	04>01>01
P202	HC2 OTC heating curve (set as required for system and building type)	04>02>00
P203	HC2 Heating system emitter type 0= UFH, 1=Radiator, 2=Convector	04>02>01
System Configuration (other settings)		
P302 – P317	DHW set-point s and parameters	04>03>00-16
P104	HC1 Room compensation settings	04>01>02
P105, P106	HC1 minimum and maximum supply set-points	04>01>03-04
P204	HC2 Room compensation settings	04>02>02
P205, P206	HC2 minimum and maximum supply set-points	04>02>03-04
Inputs to system controller		
U1	System flow sensor (See Configuration drawing)	Extra Low voltage
U2	Heating Circuit 1 flow sensor	Extra Low voltage
U4	Heating circuit 2 flow sensor	Extra Low voltage
Outputs from system controller		
X1	Heating circuit 1 circulation pump (alternatively powered from local heating system, see text)	230 Volts
X2:X3	Heating circuit 1 mixing valve	230 Volts
X4	Heating circuit 2 circulation pump (alternatively powered from local heating system, see text)	230 Volts
X5:X6	Heating circuit 2 mixing valve	230 Volts

Configuration H – Heat pump for heat only. No additional heat sources.



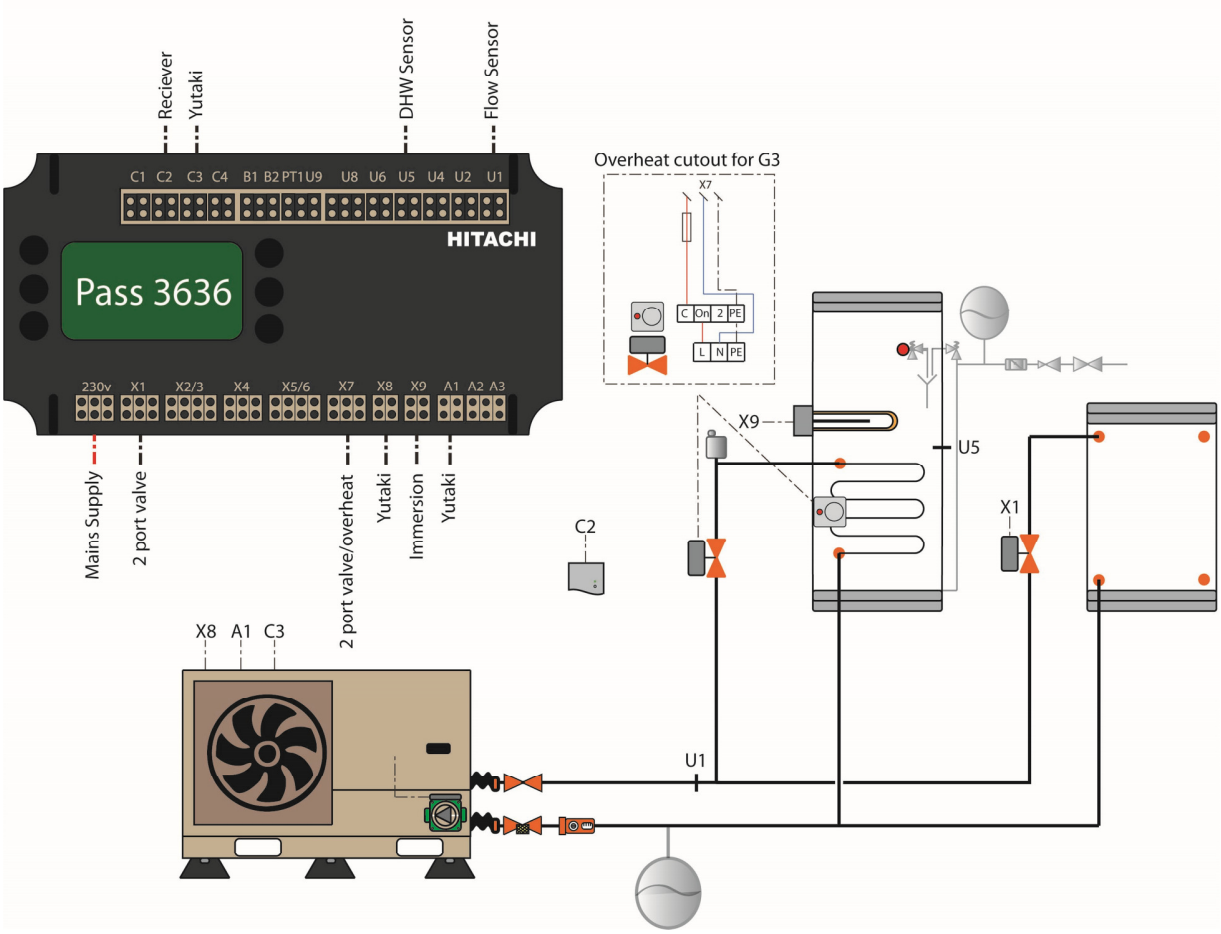
Configuration H - System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 1.2	Reset menu
System Configuration (other settings)		
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02

Inputs to system controller - Configuration 1.0		
U1	System supply temperature sensor	Extra Low voltage



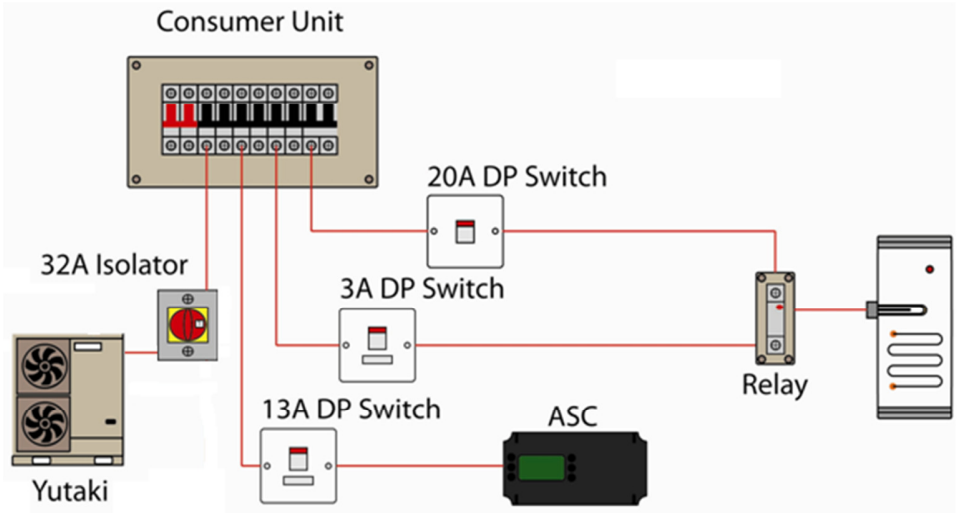
Outputs from system controller – Configuration 1.0		
X1	Heating circulation pump (Optional local control)	230 Volts
X8	Heat pump on/off	230 Volts
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

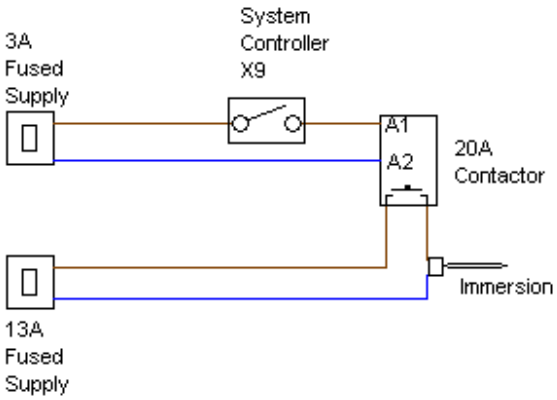
Configuration 1.0 – Heat pump with control valves, DHW with Legionella control immersion heater and heating buffer tank. No additional heat sources.



Configuration 1.0 - System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 1.2	Reset menu
P301	DHW type 2 (pump) N.B. 2 port valves are treated as pumps for the purpose of this configuration	03>03
P310	DHW Electric heater type 1 (Enable heater)	03>04
P309	DHW Anti legionella protection	04>03>07
System Configuration (other settings)		
	DHW loading times	01
P302 – P317	DHW set-point s and parameters	04>03>00-16
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02

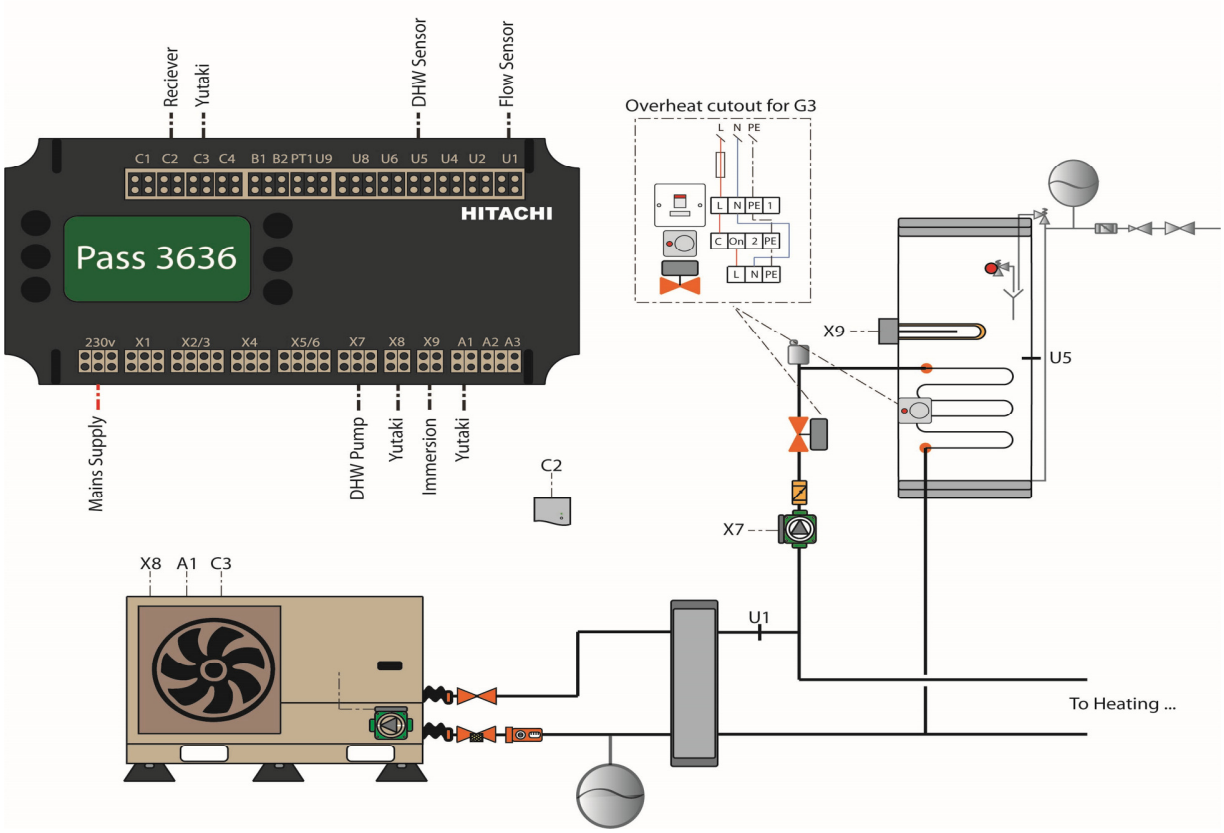
Inputs to system controller - Configuration 1.0		
U1	System supply temperature sensor	Extra Low voltage
U5	DHW temperature sensor	Extra Low voltage



Outputs from system controller – Configuration 1.0		
X1	Heating circulation pump	230 Volts
X7	DHW valve	230 Volts
X8	Heat pump on/off	230 Volts
X9	DHW Immersion heater relay control **NOTE: Do NOT connect the immersion heater to the controller without an intermediate relay. See below.**  	230 Volts **DANGER (External power source to X9, Isolate elsewhere)**
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

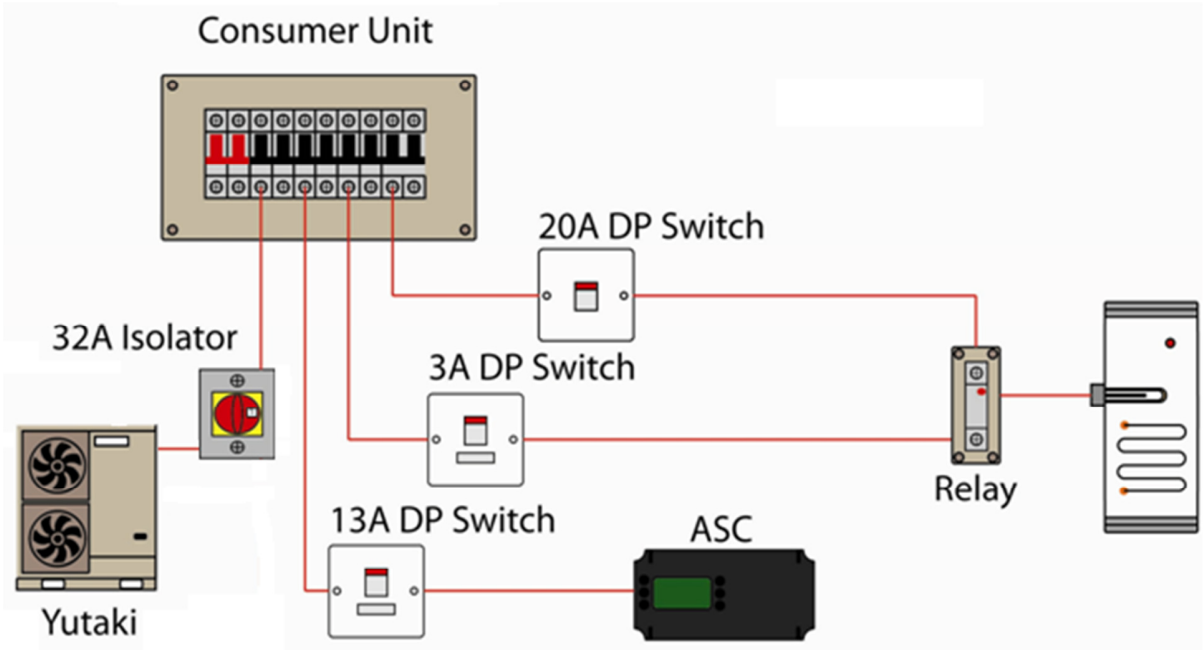
Configuration 1.2 – Heat pump with hydraulic separator, pumped DHW with Legionella control immersion heater. No additional heat sources.

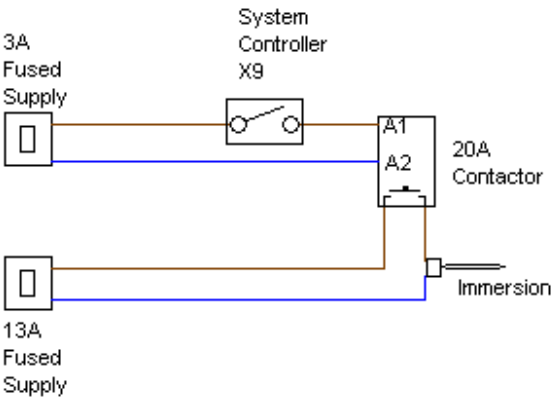
N.B. X1 ***must*** be used for Heating circulation with a suitable open flow volume and flow rate with this configuration



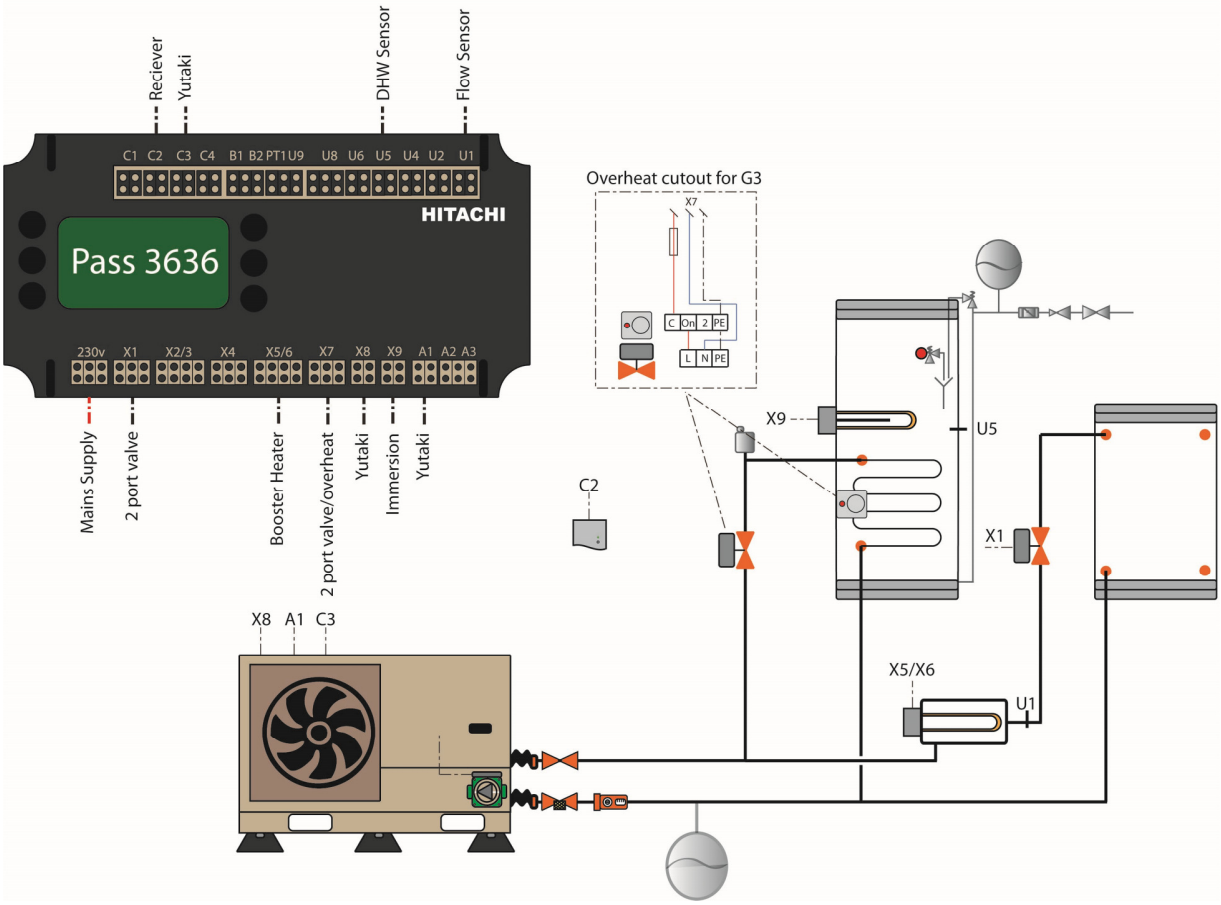
Configuration 1.2 – System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 1.2	Reset menu
P301	DHW type 2 (pump)	03>03
P310	DHW Electric heater type 1 (Enable heater)	03>04
P309	DHW Anti legionella protection	04>03>07
System Configuration (other settings)		
	DHW loading times	01
P302 – P317	DHW set-point s and parameters	04>03>00-16
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02

Inputs to system controller – Configuration 1.2		
U1	System supply temperature sensor	Extra Low voltage
U5	DHW temperature sensor	Extra Low voltage



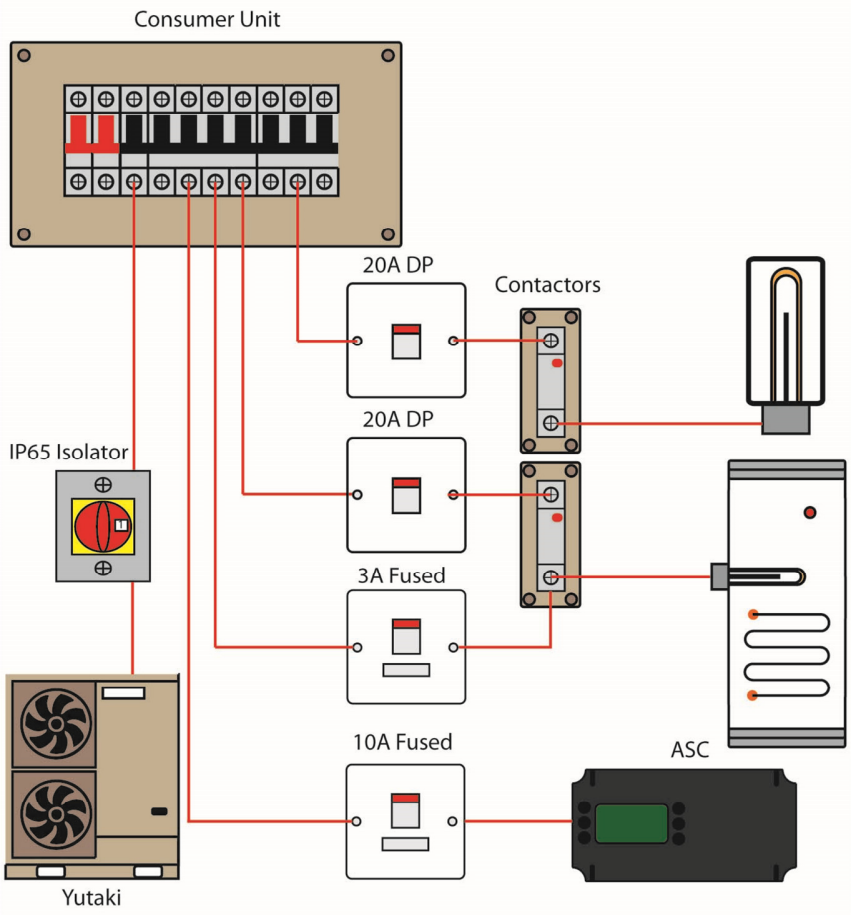
Outputs from system controller – Configuration 1.2		
X1	Heating circuit 1 circulation pump	230 Volts
X2:X3	Heating circuit 1 mixing valve	230 Volts
X4	Heating circuit 2 circulation pump	230 Volts
X5:X6	Heating circuit 2 mixing valve	230 Volts
X7	3 port valve	230 Volts
X8	Heat pump on/off	230 Volts
X9	DHW Immersion heater relay control **NOTE: Do NOT connect the immersion heater to the controller without an intermediate relay. See below.**  	230 Volts **DANGER (External power source to X9, Isolate elsewhere)**
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

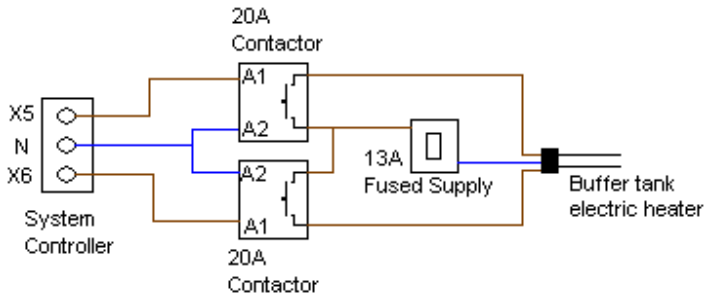
Configuration 2.0 – Heat pump with heating buffer, valve control DHW with Legionella control immersion heater and Electric heating backup



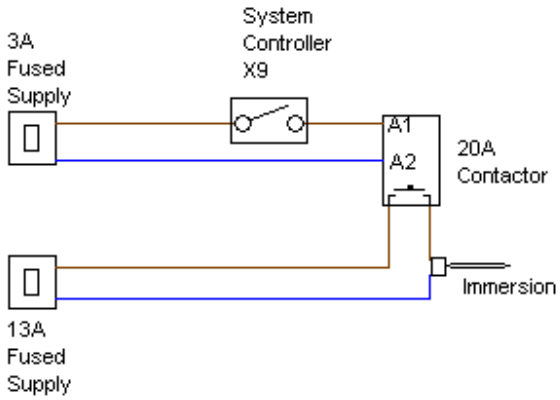
Configuration 2.0 – System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 2.2	Reset menu
P301	DHW type 2 (pump)	03>03
P310	DHW Electric heater type 1 (Enable heater)	03>04
P309	DHW Anti legionella protection	04>03>07
System Configuration (other settings)		
	DHW loading times	01
P302 – P317	DHW set-point s and parameters	04>03>00-16
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02
P801 – P810	Electric heater parameters	04>06>00-09
P009	Electric heater manual release on heat pump fault	03>06

Inputs to system controller – Configuration 2.0		
U1	System supply temperature sensor	Extra Low voltage
U5	DHW temperature sensor	Extra Low voltage



Outputs from system controller – Configuration 2.0		
X1	Heating circuit 2 port valve	230 Volts
X5:X6	3 stage electric heater relay control **NOTE: Do NOT connect the buffer immersion heater to the controller without an intermediate relay. See example below.** 	230 Volts
X7	DHW 2 port valve	230 Volts
X8	Heat pump on/off	230 Volts

PTO for remaining connections

X9	DHW Immersion heater relay control **NOTE: Do NOT connect the immersion heater to the controller without an intermediate relay. See below.**  	230 Volts **DANGER** **(External power source to X9, Isolate elsewhere)**
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

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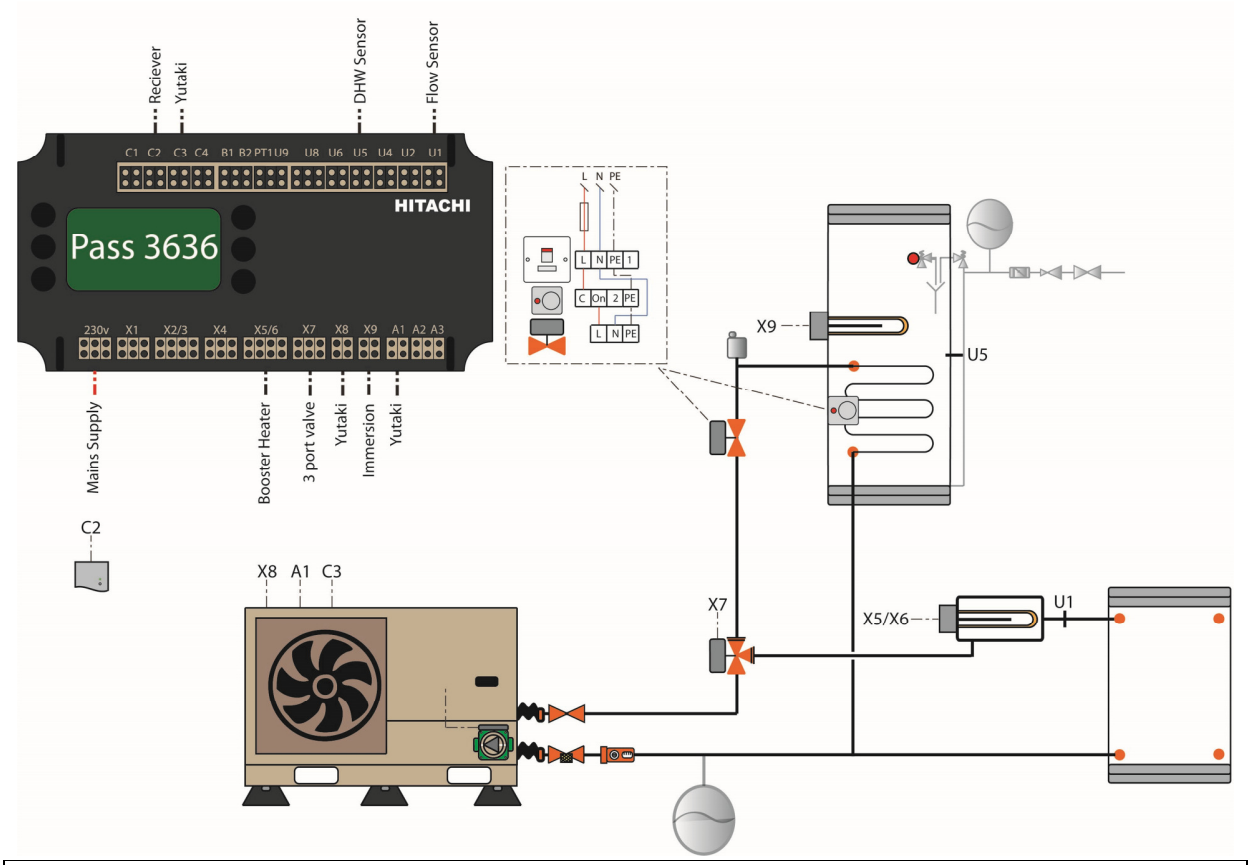
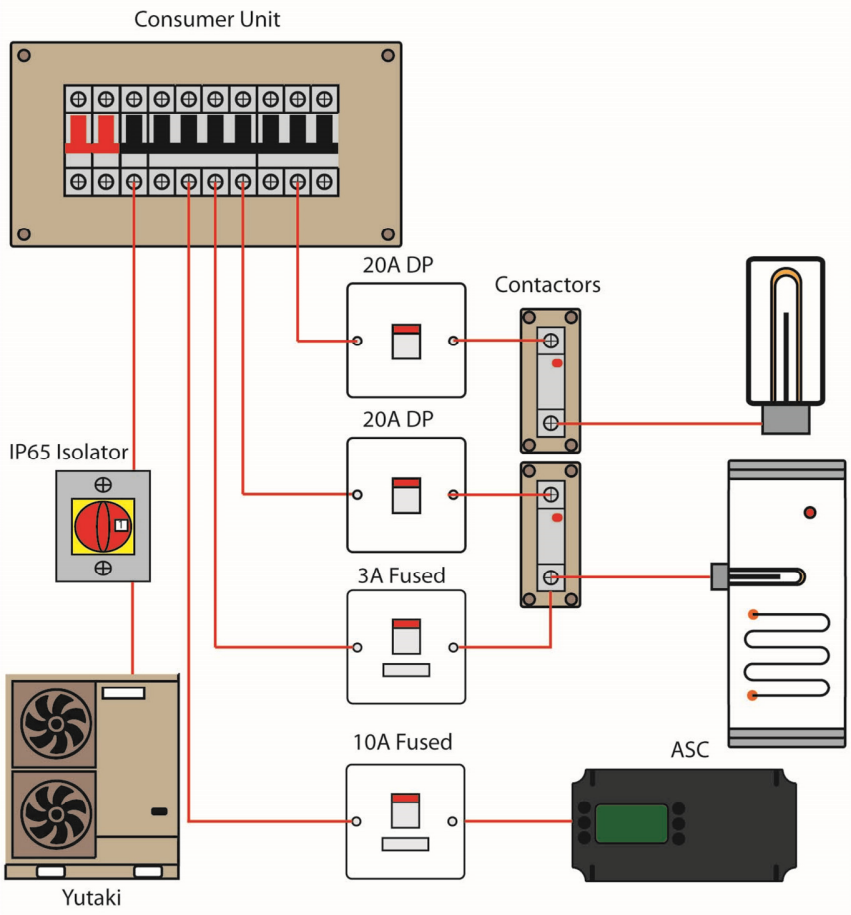
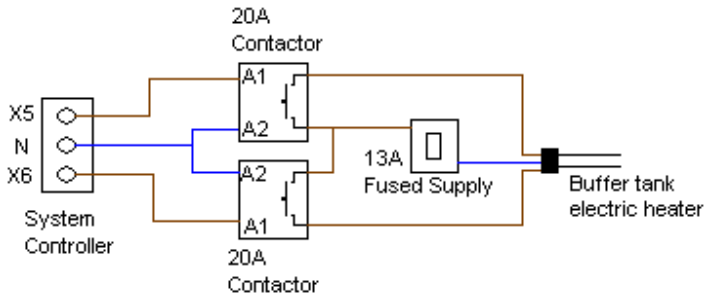
Configuration 2.1– Heat pump with 3 port mixer valve heating via buffer DHW with Legionella control immersion heater and Electric heating backup



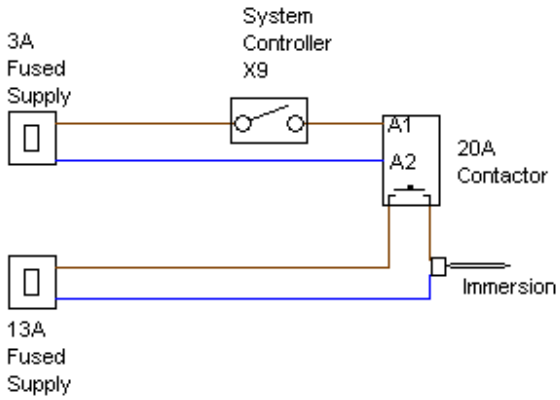
Configuration 2.1 – System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 2.1	Reset menu
P301	DHW type 1 (valve)	03>03
P310	DHW Electric heater type 1 (Enable heater)	03>04
P309	DHW Anti legionella protection	04>03>07
System Configuration (other settings)		
	DHW loading times	01
P302 – P317	DHW set-point s and parameters	04>03>00-16
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02
P801 – P810	Electric heater parameters	04>06>00-09
P009	Electric heater manual release on heat pump fault	03>06

Inputs to system controller – Configuration 2.1		
U1	System supply temperature sensor	Extra Low voltage
U5	DHW temperature sensor	Extra Low voltage



Outputs from system controller – Configuration 2.1		
X5:X6	3 stage electric heater relay control **NOTE: Do NOT connect the electric heater to the controller without an intermediate relay. See example below.** 	230 Volts
X7	Heating / DHW 3 port valve	230 Volts
X8	Heat pump on/off	230 Volts

PTO for remaining connections

X9	DHW Immersion heater relay control **NOTE: Do NOT connect the immersion heater to the controller without an intermediate relay. See below.**  	230 Volts **DANGER** **(External power source to X9, Isolate elsewhere)**
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

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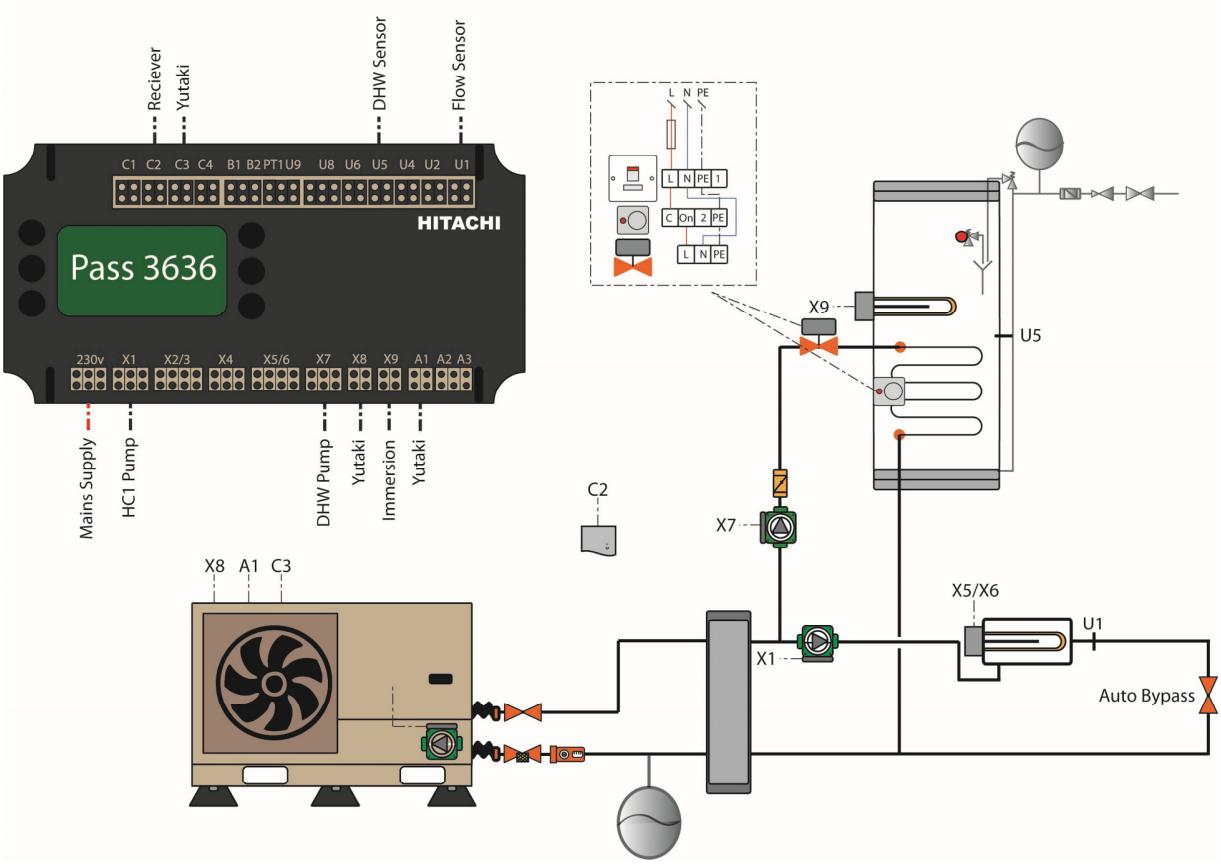
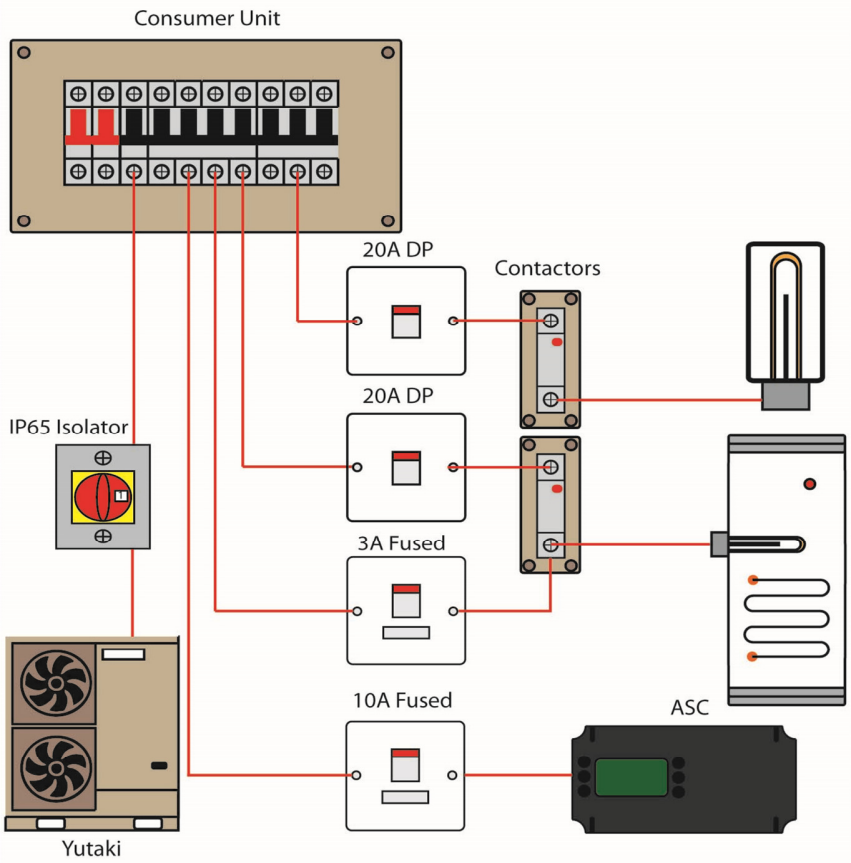
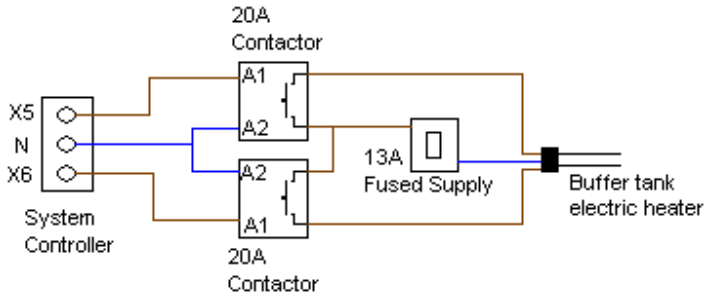
Configuration 2.2 – Heat pump with hydraulic separator, pumped DHW with Legionella control immersion heater and electric heating backup



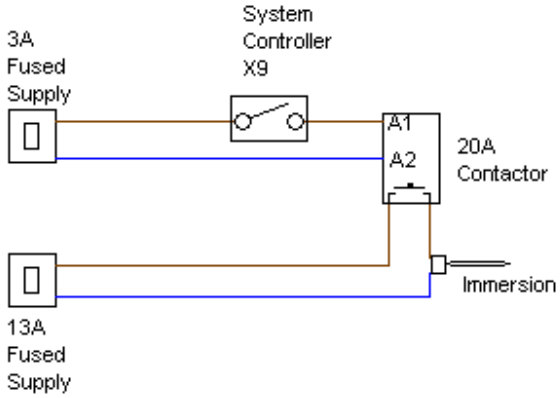
Configuration 2.2 – System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 2.2	Reset menu
P301	DHW type 2 (pump)	03>03
P310	DHW Electric heater type 1 (Enable heater)	03>04
P309	DHW Anti legionella protection	04>03>07
System Configuration (other settings)		
	DHW loading times	01
P302 – P317	DHW set-point s and parameters	04>03>00-16
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02
P801 – P810	Electric heater parameters	04>06>00-09
P009	Electric heater manual release on heat pump fault	03>06

Inputs to system controller – Configuration 2.2		
U1	System supply temperature sensor	Extra Low voltage
U5	DHW temperature sensor	Extra Low voltage



Outputs from system controller – Configuration 2.2		
X1	Heating circuit 2 port valve	230 Volts
X2:X3	Heating circuit 1 mixing valve	230 Volts
X4	Heating circuit 2 circulation pump	230 Volts
X5:X6	3 stage electric heater relay control **NOTE: Do NOT connect the electric heater to the controller without an intermediate relay. See example below.** 	230 Volts
X7	DHW pump	230 Volts
X8	Heat pump on/off	230 Volts

PTO for remaining connections

X9	DHW Immersion heater relay control **NOTE: Do NOT connect the immersion heater to the controller without an intermediate relay. See below.**  	230 Volts **DANGER** **(External power source to X9, Isolate elsewhere)**
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

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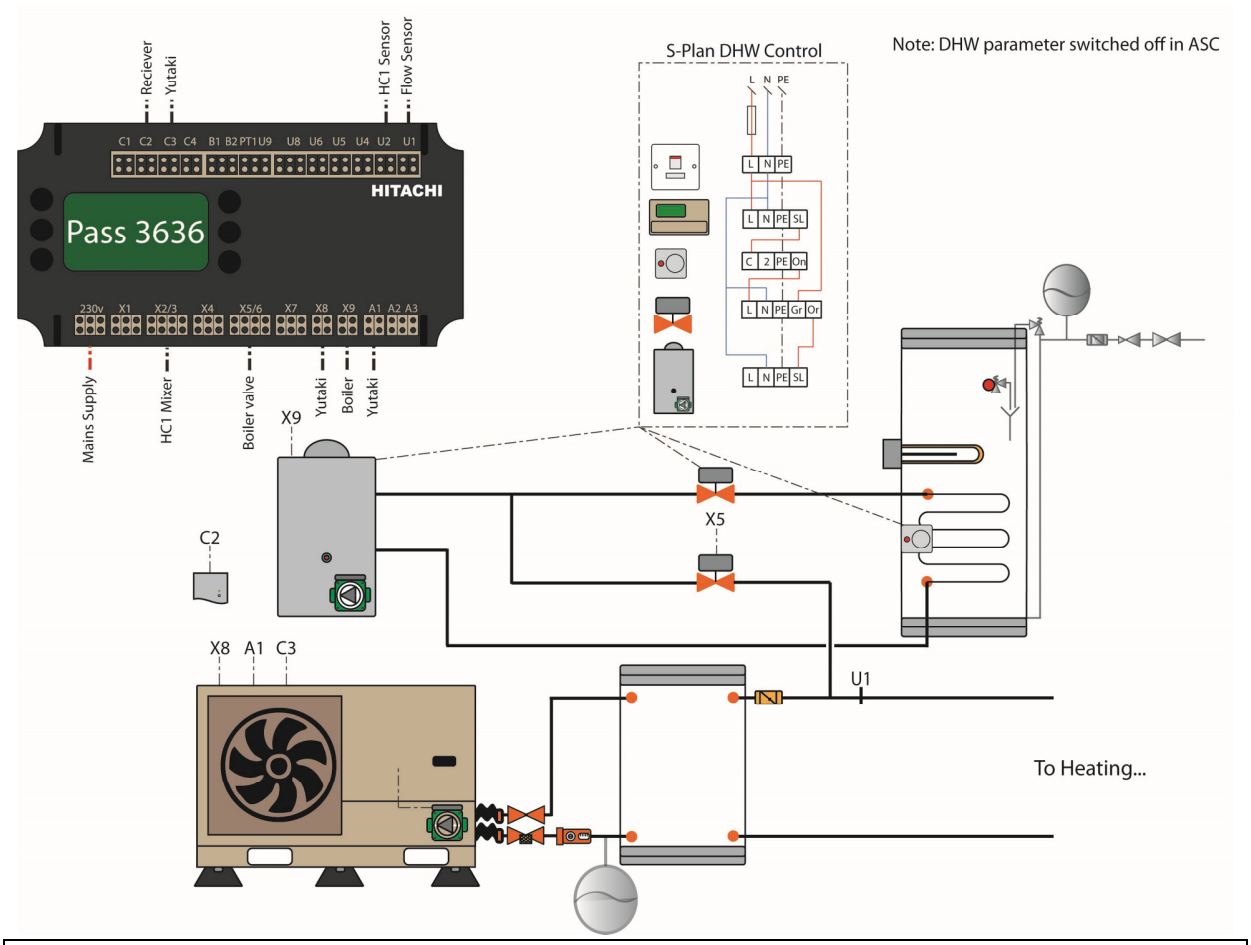
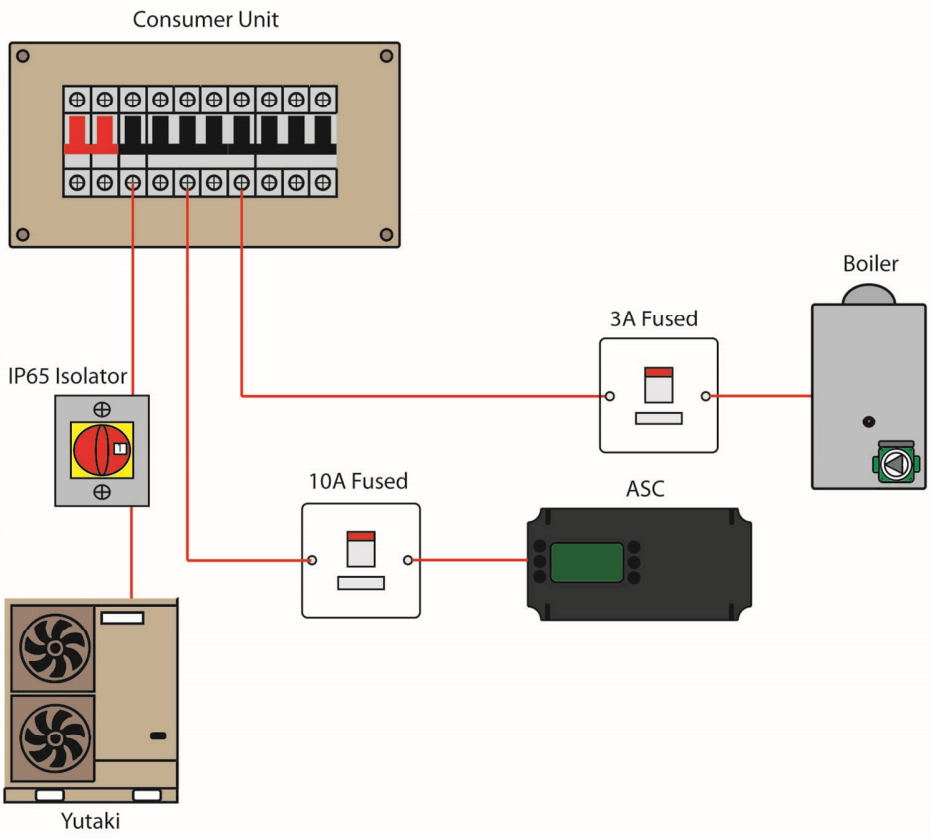
Configuration 3.1 – Heat pump with boiler only for hot water and heating support



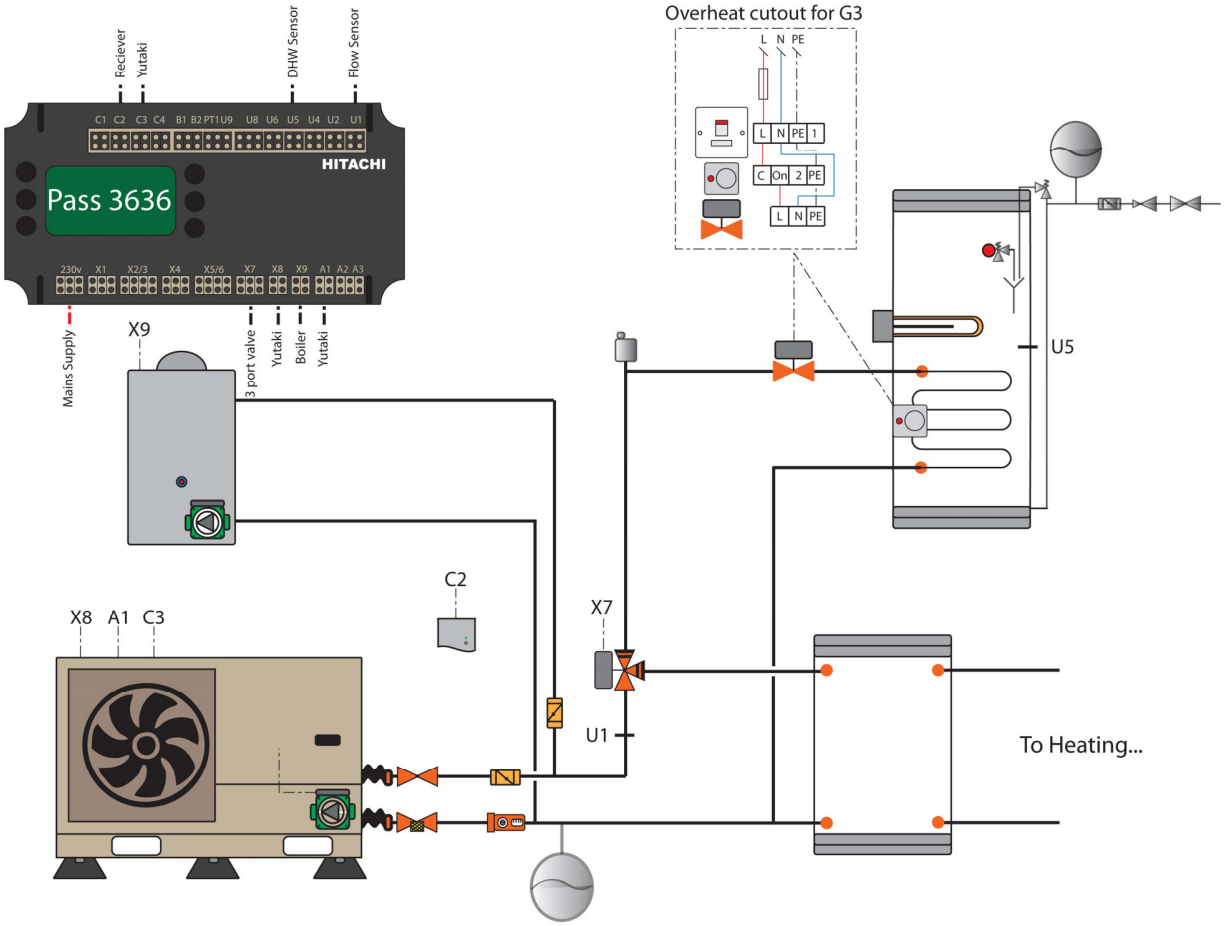
Configuration 3.1 – System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 3.1	Reset menu
P301	DHW type 0 (off)	03>03
System Configuration (other settings)		
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02
P701 – P716	Boiler operating parameters	04>05>00-15
P008	Boiler manual release on heat pump fault	03>05

Inputs to system controller – Configuration 3.2		
U1	System supply temperature sensor	Extra Low voltage



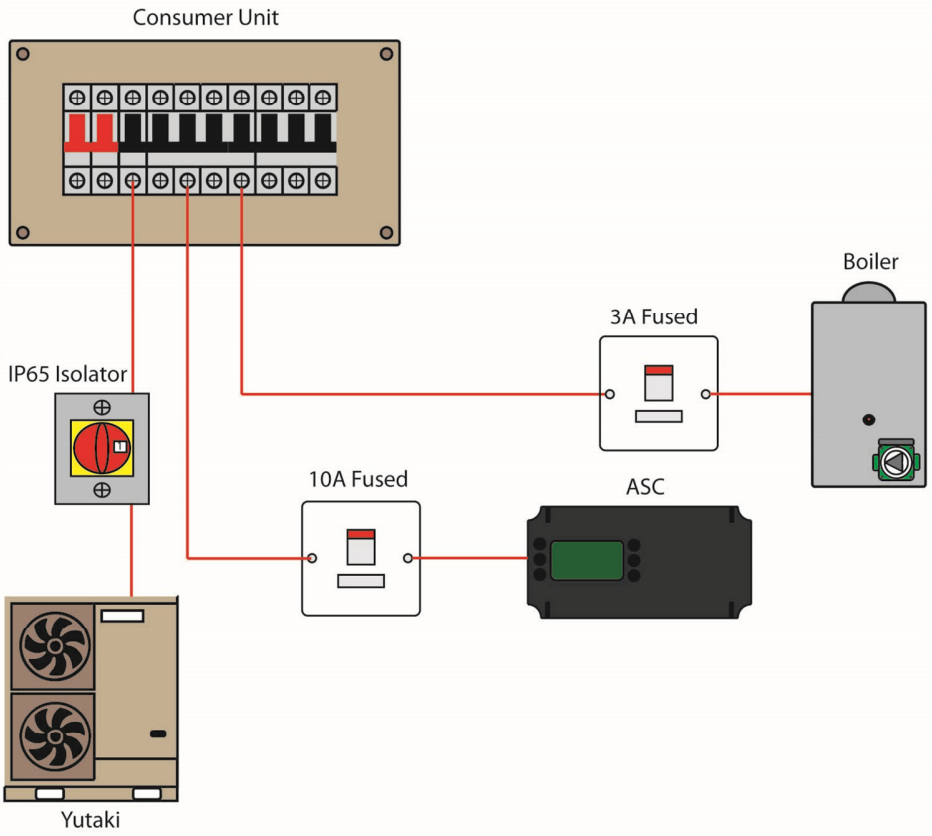
Outputs from system controller – Configuration 3.2		
X5	Heating circuit valve	230 Volts
X7	DHW pump	230 Volts
X8	Heat pump on/off	230 Volts
X9	Boiler on / off	230 Volts **Danger, power supplied from external source. Isolate elsewhere**
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

Configuration 3.2 – Heat pump with boiler support , and DHW



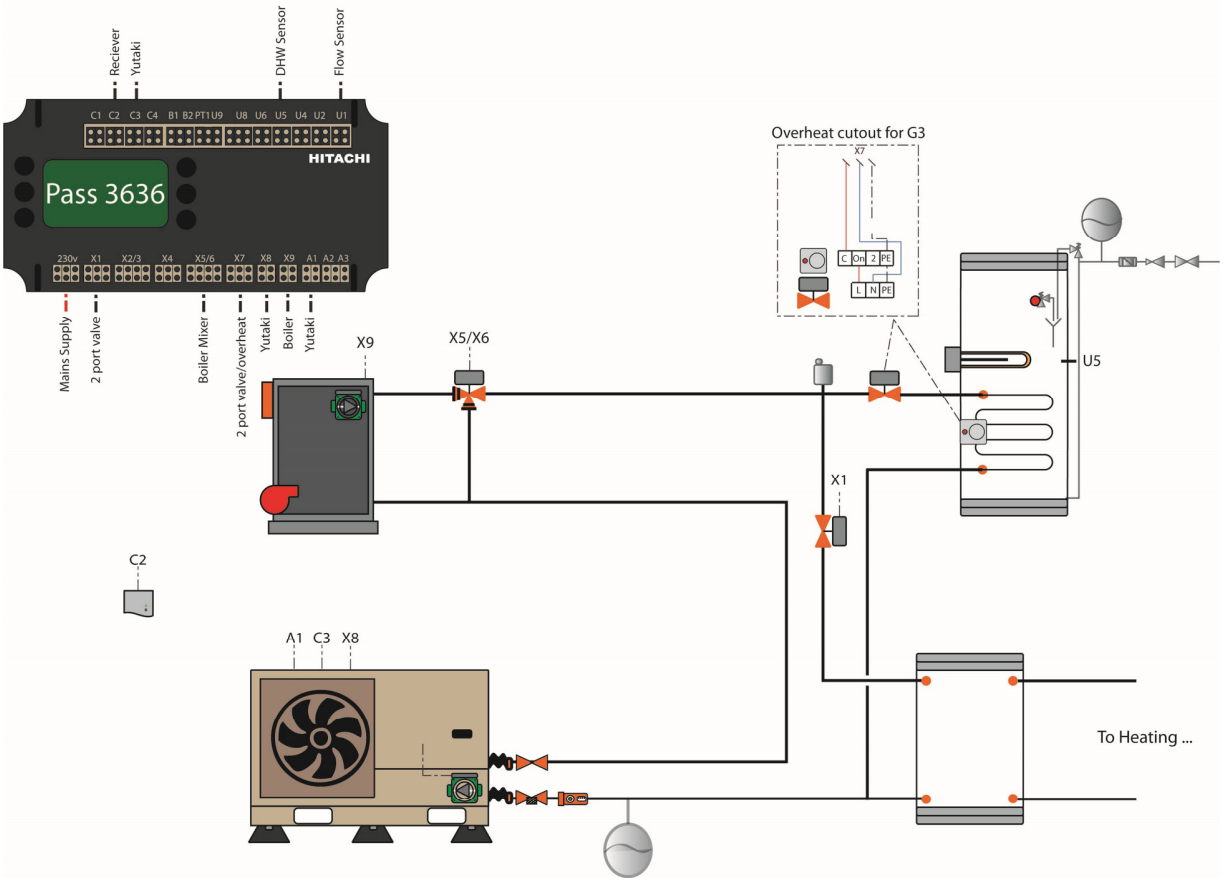
Configuration 3.2 – System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 3.2	Reset menu
P301	DHW type 2 (pump)	03>03
System Configuration (other settings)		
	DHW loading times	01
P302 – P317	DHW set-point s and parameters	04>03>00-16
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02
P701 – P716	Boiler operating parameters	04>05>00-15
P008	Electric heater manual release on heat pump fault	03>05

Inputs to system controller – Configuration 3.2		
U1	System supply temperature sensor	Extra Low voltage
U5	DHW temperature sensor	Extra Low voltage



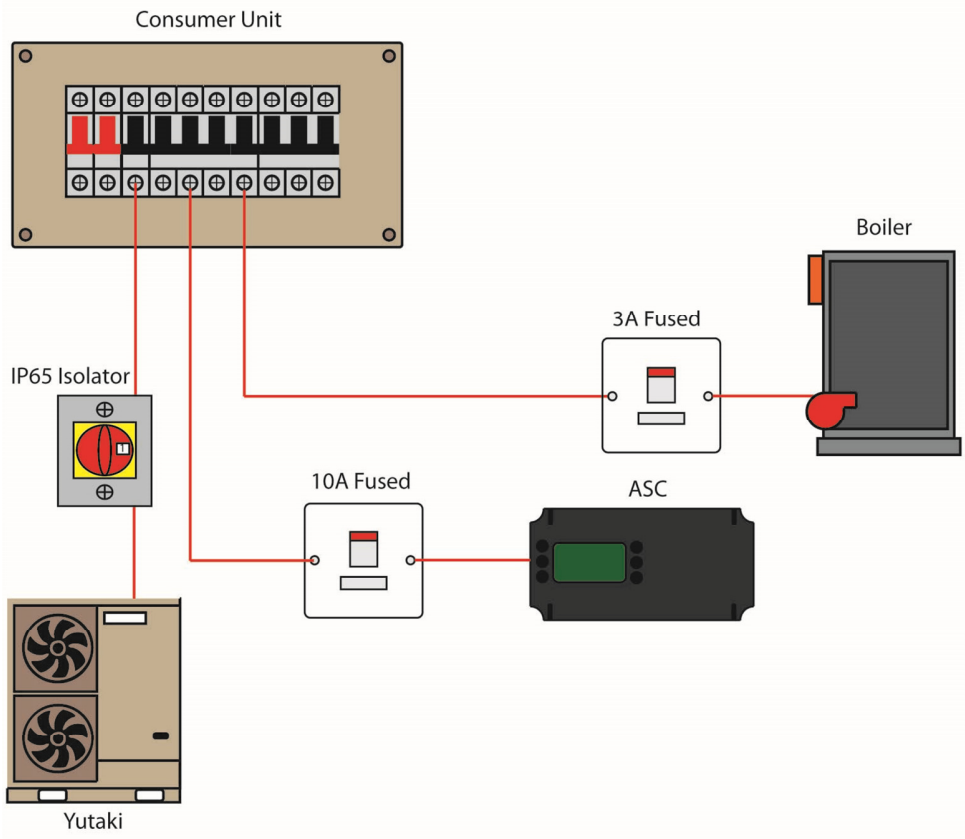
Outputs from system controller – Configuration 3.2		
X7	DHW valve	230 Volts
X8	Heat pump on/off	230 Volts
X9	Boiler on / off	230 Volts **Danger, power supplied from external source. Isolate elsewhere**
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

Configuration 4.1 – Heat pump with boiler mixer support , 2 heating circuits and DHW



Configuration 4.1 – System Configuration (essential settings)		
Parameter	**Description**	**Menu**
Conf	System Configuration 4.1	Reset menu
P301	DHW type 2 (pump)	03>03
System Configuration (other settings)		
	DHW loading times	01
P302 – P317	DHW set-point s and parameters	04>03>00-16
P001 – P002	Frost protection parameters	04>00>00-01
P003	Summer switch off	04>00>02
P701 – P716	Boiler parameters	04>05>00-15
P008	Boiler manual release on heat pump fault	03>05

Inputs to system controller – Configuration 4.1		
U1	System supply temperature sensor	Extra Low voltage
U2	Heating circuit 1 supply temperature	Extra Low voltage
U5	DHW temperature sensor	Extra Low voltage
U6	Boiler temperature sensor	



Outputs from system controller – Configuration 4.1		
X1	Heating valve	230 Volts
X5:X6	Boiler bypass / mixing valve	230 Volts
X7	DHW valve	230 Volts
X8	Heat pump on/off	230 Volts
X9	Boiler on / off	230 Volts **Danger, power supplied from external source. Isolate elsewhere**
A1	Heat pump 0 – 20mA control	Extra low voltage
C2	RF Receiver	Extra Low voltage
C3	Heat pump communications signal	Extra Low voltage

Commissioning procedure

Do ***Not*** apply power to the heat pump or controller

1. Complete checklist at the end of this document
2. Remove Heat pump Connections C3, X8 and A1 from the controller
3. Apply power to the controller and set parameters

   Initial setting for the heat pump RHUE-(3-6)A(V)HN-HM units as follows:
   Enter 'Service' mode using code 6565.

   Press ▽ to scroll through the menu items
   Go down to 04 'Parameters'
   Press OK to select the menu item (enter sub-menu)
   Go down to 04>04 'Heat pump'
   Press OK to select the menu item (enter sub-menu)

   Change the parameters as follows:
   P603 55°C
   P604 55°C
   P606 55°C

   After changing the parameters return to the main screen by pressing the "Esc" button.

4. Using the Installer code 3636, enter 'Installer' menu and set/check all system parameters for the chosen configuration.

5. From menu 8 select each system output in turn and set then reset to ensure expected operation of each device connected.

   E.G. Select menu 8 'Outputs'
   Press 'set' to get to menu 08>00 HC1 pump
   Press 'set' to enable change of output state
   Press ▽ or △ to change state
   Press 'set' to engage new state
   Check that HC1 pump is now running
   Press 'set' to enable change of output state
   Press ▽ or △ to change state
   Press 'set' to engage new state
   Check that HC1 pump is now stopped
   Repeat process for all connected accessories

6. Select Menu 08>12 and set to 1 which will clear all manual relay settings
7. Press ‘ESC’ and make sure that ‘hand’ icon is not displayed.
8. Remove power to ASC
9. Re-connect heat pump connections C3, X8 and A1
10. Power heat pump
11. Power ASC
12. Check alarm status on controller and take corrective action if any alarms persist
13. Ensure system is calling for heat and hot water
14. Monitor flow rate for heating, hot water and defrost functions
15. Systematically check all system elements for correct operation
16. Hand over all documentation to customer
17. Complete system commissioning documents and return to Hitachi

Hitachi Yutaki Nominal flow rate requirements

Based on a delta T of 5 degrees C.
Ensure the flow meter setting is correct before finalising commissioning.

RHUE-3 AVHN1	RHUE-3 AVHN-HM	RHUE-4 AVHN-HM	RHUE-5 AVHN-HM	RHUE-6 AVHN-HM	RHUE-5 AHN-HM	RHUE-6 AHN-HM
22 l/m	20 l/m	27 l/m	34 l/m	40 l/m	34 l/m	40 l/m

Commissioning Certificate - Page 1 of 3

Installer name (Print name)		Commissioning engineer name (Print name)	
Installer Company Name Address Phone		Commissioning engineer Company Name Address Phone	
Customer name		Heat pump Model	
Site address		Heat pump serial no.	

Installation details			
Heat pump location			
Buffer tank / Hydraulic separator location			
Cylinder location			
Pipe size/ type from heat pump to cylinder and buffer.			
Heating system description e.g. ufh, radiators etc.	Ground	First	Other (state detail)
Heat pump configuration reference (delete as appropriate)	1.0 1.1 1.2 2.0 2.1 2.2 3.0 3.1 3.2 4.1 Other (describe)		
Additional heat source	Make	Model	Capacity (Kw)

PTO

Commissioning Certificate – Page 2 of 3

Installation Checklist	
Heat pump fixed on solid surface	
Away from sleeping areas and neighbouring property	
Away from influences of strong wind	
Away from possible snow build up	
Away from dripping water sources	
Ambient temperature sensor away from direct sunlight	
Minimum distance of 500mm from rear wall	
Maintenance access from all sides and above	
Free passage of air around heat pump	
Positioned where cold air from unit shall not cause a nuisance	
Anti vibration mountings fitted	
Anti tipping fixings on base fittings	
Anti tipping fixings fitted from top of machine to nearby supporting structure	
Safe drainage of condensate away from walkways	
Flexible pipe-work from heat pump to building	
Insulation of external pipe-work	
Physical protection of electrical wiring	
Electrical separation of power and control wiring	
Ingress protection of installed electrical wiring and external switches to IP65 or better	
Flow and return pipes identified	
Full bore heat pump isolation valves fitted	
Strainer correctly fitted on heating return pipe-work, suitably fixed and accessible for regular maintenance	
Potential air trap points have automatic air vents fitted	
G3 components fitted where required	
Expansion vessels charge set	Vessel 1 type .....colour.....charge..... Vessel 2 type .....colour.....charge..... Vessel 3 type .....colour.....charge.....
System has been flushed and cleaned in accordance with BS7593	
Corrosion inhibitor added (Type, Quantity)	
Bypass valves set appropriately	
System filled and vented with all valves open	
Suitably rated Circuit breaker and cable for heat pump	
Suitably rated Circuit breaker and cable for immersion heater	
Suitably rated fuses in spur outlet for Advanced System Controller	
Suitably rated fused supplies to all other ancillary components	
Heating and hot water sensors correctly fitted with good thermal contact and mechanically sound	
Outside sensor (if fitted) mounted away from direct sunlight and on North facing wall.	
Electrical installation complies with BS7671	
Installation complies with Building regulations	

Heat pump commissioning certificate – Page 3 of 3

Operational Test Results			
DHW heating time		DHW final temperature	
Flow rate during DHW			
Heat pump flow temperature (DHW)		Heat pump return temperature (DHW)	
Heat pump flow temperature (Heating)		Heat pump return temperature (Heating)	
Flow rate during heating			
HC1 flow temperature (Heating)		HC1 return temperature (Heating)	
HC2flow temperature (Heating)		HC2 return temperature (Heating)	
Flow rate during defrost			
DHW Time settings	Period 1	Period 2	
Room Unit settings Time & Temp. e.g. 6am & 21°C	Period 1	Period 2	
	Period 3	Period 4	
	Period 5	Period6	
Commissioning engineer notes			

Operation and system controls demonstrated to customer	
Manufacturers literature left with customer	

Signature of commission engineer …….. Date…….

Customer signature …….. Date…….

Service Record

Service 1	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 2	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 3	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 4	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 5	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 6	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service Record

Service 7	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 8	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 9	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 10	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 11	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	

Service 12	
Date	
Engineer name	
Company name	
Contact telephone	
Engineer comments	
Engineer signature	
Customer signature	